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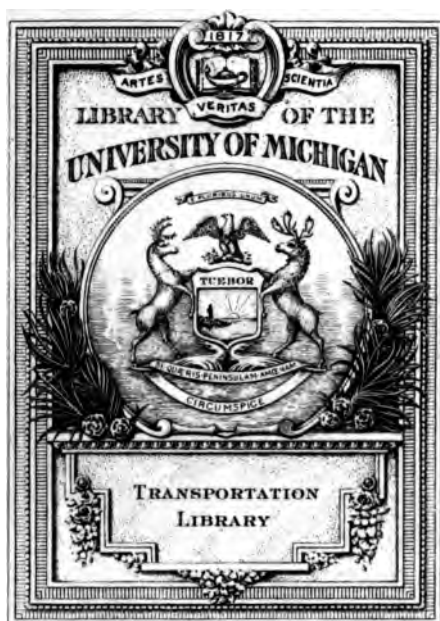
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A 100000
RAILWAY EXPANSION
IN
LATIN AMERICA

By FREDERIC M. HALSEY

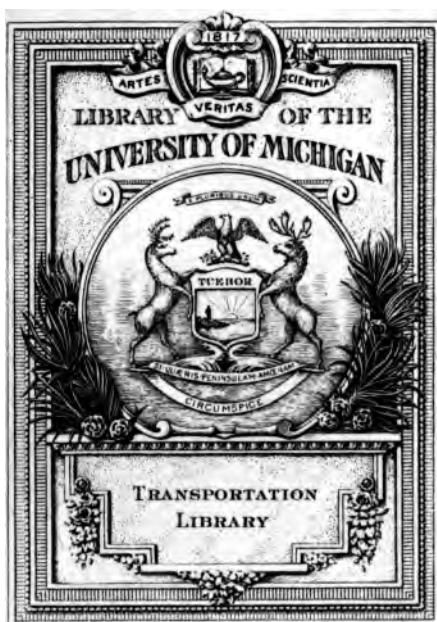


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Photo by P. S. Penfield.

TRAIN EMERGING FROM THE TRANS-ANDINE TUNNEL
AFTER A CAVE-IN. (ARGENTINA.)

RAILWAY EXPANSION IN LATIN AMERICA

Descriptive and narrative history of the railroad systems of
Argentina, Peru, Venezuela, Brazil, Chile, Bolivia
and all other countries of South and
Central America.

BY ^{sale}FREDERIC M. HALSEY

*Statistician Stock Exchange House of Jas. H. Oliphant & Co.,
New York and Chicago*

Author of "The Railways of South and Central America"

NEW YORK

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1916



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FOREWORD

THIS book is really the outgrowth of a series of ten articles which appeared in "MOODY'S MAGAZINE" during 1914 and 1915. In response to a number of requests received by the author that these articles be published in book form they are here presented, with, however, a few additions and alterations.

A word of thanks is due to the "PAN-AMERICAN UNION" of Washington, D. C., and to Mr. Percy S. Penfield of Danbury, Conn., for permission to use certain illustrations contained in this book.

FREDERIC M. HALSEY.

INTRODUCTORY

LATIN AMERICA is a golden field for legitimate investments. Although a majority of the twenty-one republics south of the United States were explored and settled at a date prior to the landing of John Smith at Jamestown, geographical, financial and other reasons have prevented these republics from keeping pace with our country. The millions of immigrants who sought our shores furnishing us with labor, and the great inflow of gold invested by the creditor nations of Europe in our railroads and industries, enabled us to develop our enormous resources and to take our place in the front rank of nations. Thus we outpaced our Latin neighbors and practically forgot their existence.

Europe, though it expended billions financing our needs, had still more funds in its purse. Some of these funds were diverted to Africa, Southern Europe, India and the Far East; likewise large amounts were invested in Latin America. Here was a great field, and two of the nations—Great Britain and France—were not slow to grasp the opportunities which awaited them. British capitalists took over most of the tiny straggling, half-built railways scattered here and there throughout South America, financed and extended them and made them into large profitable systems. By means of British capital, tramway lines, power plants and comprehensive water systems were constructed in the various cities; companies were formed to develop agricultural areas, and mines and industries were exploited.

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All told, Great Britain's investments in Latin American securities have totalled nearly five billions of dollars. Nearly three billion dollars of this amount have been invested in Argentina, including a billion in its railways; one billion or more in Brazil, and about one-half of this latter amount in Chile. France has likewise put large amounts into Latin American enterprises, particularly into Brazilian railways, several of which were constructed by means of capital furnished by Parisian bankers. Most of the French investments in Latin America have been successful—an exception being the ill-fated de Lesseps' Panama Canal Company, in which enterprise a great many millions of francs were irretrievably lost.

What of our own investments in this great field? In Mexico, Cuba and Porto Rico, Central America and Panama, American investments have been fairly large. Our mining, smelting and oil interests in Mexico are considerable, while the great United Fruit Company, an enterprise of which we are duly proud, is a great factor in the development of Central America and the West Indies. In Panama we have interests. The Panama Railroad, which Messrs. Stephens, Chauncey, Trautwine, and their associates—all Americans—laid across the Isthmus at a cost of several millions of dollars and many hundreds of lives, now a Government enterprise and for many years immensely profitable, has been practically superseded by the Great Canal just completed.

South of Panama our interests are few and far be-

.....

tween. Although Meiggs, Thorndyke, Wheelwright, Col. Church and other Yankee engineers were the pioneer railway builders of the west coast of South America, practically none of the companies operating the lines which they built has any American stockholders. Meiggs made his name famous through the construction of the Oroya or Peruvian Central Railway, the highest and most wonderful line in the world, surmounting within a distance of less than 200 miles an altitude of 15,865 feet. This railway bankrupted the Peru of the Nineteenth Century, but, inasmuch as it placed the resources of the great Andine Plateau within reach of the markets of the world, it was largely responsible for the rapid progress Peru has been able to make since the beginning of the Twentieth Century.

A few mines in Chile and Peru, most notably the mines of the Chile Copper Company, the Braden Copper Company and the Cerro de Pasco Company are owned by American corporations; likewise the International Petroleum Company (Peru), the Bethlehem Steel Company (owning the Tofo mines in Chile), and the General Asphalt Company (Venezuela) are important commercial factors in South America.

Owing to the great war now raging the nations involved will likely not have any surplus funds for some time to come; therefore Latin America must necessarily look to the United States for financial aid, and will in time doubtless find us willing to grasp some of the many opportunities which it has to offer.

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To begin with, it might be suggested that a number of the larger South American enterprises controlled abroad be invited to make formal application to list their securities on the New York Stock Exchange. It is true that at the present time the American public knows little regarding the merits of these securities, and there is no great likelihood that there would be any extensive market for them in the near future. However, as our investing public becomes familiar with their intrinsic merit a comparatively large business could no doubt be developed. The companies operating the various railroads in South America will mostly require funds to build extensions and to carry on further development, and it is not unlikely that they will be able to sell some new issues of bonds and stocks here in this market.

Regarding the safety of many of these investments, it may be stated that a number of the South American railway debentures and bonds sell on the London Stock Exchange in normal times practically on a parity with such bonds as Pennsylvania R. R. Consol. 4s and Atchison General 4s, and that the stocks of a number of the more successful companies sell at from par to \$300 per share. When we become acquainted with the Latin American investment field we shall doubtless be able to finance various new projects presenting themselves from time to time.

FREDERIC M. HALSEY.

NOTE: This introductory is largely compiled from an article "Latin American Investment Opportunities," written by the author of this book, and which appeared in the "Magazine of Wall Street" July 24, 1915.

CHAPTER I

ARGENTINE REPUBLIC.

THE MOST PROSPEROUS COUNTRY IN LATIN AMERICA—WEALTH OF NATION—SPLENDID RAILWAY SYSTEM, ITS ORIGIN AND DEVELOPMENT—THE STORY OF THE TRANSANDINE RAILWAY—RAILWAYS IN PATAGONIA.

FOR a number of years the Republic of Argentine, a Republic not only in name but in fact, has set the pace for Latin America in railway construction. Over 40 per cent. of the total railway mileage of South America is within the boundaries of that country and further development along these lines is being pushed forward at a steady pace. The expansion of Argentine's railways since 1865 is shown in the following table:

Years.	Length. Miles.	Capital in- vested.	Passengers. Number.	Freight. Metric tons.	Receipts.	Expenses.
1865..	154	\$5,379,898	747,684	71,571	\$563,134	\$438,961
1880..	1,560	62,964,486	2,751,570	772,717	6,560,417	3,072,185
1890..	5,848	321,102,691	10,069,606	5,420,782	26,049,042	17,585,406
1900..	10,269	531,398,720	18,296,422	12,659,831	41,401,348	23,732,754
1909..	15,815	898,913,000	50,830,000	31,955,000	103,578,000	62,272,000
1912..	*20,400	1,120,210,000	68,457,090	33,640,206	119,333,796	75,680,837
1913..	†21,196	1,210,475,331	80,279,940	43,038,082	142,233,334	89,419,518

*Of these 20,400 miles, 12,360 miles were broad, that is, 5½ feet gauge; 1,645 miles were medium, 4 feet 8½ inches or standard gauge; and 6,397 miles were narrow, 1 meter gauge.

†As of December 31, 1915, approximately 22,000 miles of line were open for traffic.

In all 17,330 miles of road are owned privately and 3,866 miles belong to the Government. The latter's mileage represents an investment of \$125,000,000. Great Britain has some \$970,000,000 in the railways of this

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Republic, owning 14,300 miles of road. France, Belgium, and the United States are also interested in certain railway properties, mostly located to the north of Buenos Ayres.

Argentina is the richest nation per capita in the world; it ranks seventh among the nations of the world in the production of wheat, fourth in the area of wheat sown, and has for several years ranked either first or second in the amount exported to other countries. The wheat production for 1912 totaled 198,000,000 bushels, of which about 100,000,000 bushels were exported. The area under cultivation, estimated at 17,100,000 acres, was said to have been not more than one-fifth of the possible area available for the growing of this product. The farms of the nation further produced in 1912, 296,000,000 bushels of maize, and vast quantities of linseed, oats, etc. The raising of domestic animals is another great source of the nation's wealth. A recent census (Dec. 31, 1913) showed that within the Republic there were 30,796,447 head of cattle, 81,485,149 sheep, 9,366,455 horses, 929,146 mules and asses, 4,563,808 goats, etc., valued at about \$800,000,000.

Argentina's foreign trade for the year ending December 31, 1915, showed a balance in the nation's favor of over \$331,000,000. The exports were \$558,280,000 as compared with imports of \$226,892,000. This compares with \$468,999,415 exports and \$408,711,986 imports during 1913 (a normal year). The almost abnormal demand for the country's products during 1915, fol-

lowing the trade demoralization throughout the latter part of 1914, has brought increased prosperity to the Republic and has made possible the disposition of its exportable surplus at relatively high prices. The total national production for 1911-12 was estimated at \$1,038,849,000, of which over 90 per cent. represented grain and live stock. The immigration for 1912-13 totaled 349,364 as against an emigration of only 143,618. While not a manufacturing country, there were in operation in 1910, 31,988 factories employing 329,490 workers. Argentina has an area of 1,139,979 square miles and a population 7,731,257. Buenos Ayres, the capital, has 1,584,106 inhabitants. It is the largest city in Latin America and the most populated capital city in either America. The city covers an area of 720 square miles, and is a marvel of splendor and luxury. Adorned with magnificent boulevards, parks and plazas, with many beautiful buildings, it may be said to be the Paris of America.

Real estate sales in the city for 1911 amounted to \$181,409,795 and there is every evidence of a rapid and continuous growth. Its traction and subway lines cover over 455 miles and carried in 1914 fully 400,000,000 passengers, as compared with about 110 miles of horse car lines operated in 1887 carrying 23,000,000 passengers.

Buenos Ayres has long been the principal port of the Republic, ranking as it does second among the ports of the Americas and seventh among the ports of the world. Here in 1913 came 5,137 vessels of 13,818,646 tons from

foreign lands bringing 85 per cent. of the imports and taking 45 per cent. of the country's exports, and here the great railway systems of the Republic have their terminals. The density of the passenger traffic converging at the capital may be gauged by the fact that fully 500 outbound passenger trains leave the capital daily.

The first railway in operation in Argentine Republic, was a little six mile line extending from Buenos Ayres to a suburb known as Flores. This railway was chartered January, 1854, and opened to the public in 1857. Its owners, not being over supplied with funds, availed themselves of an opportunity to purchase a quantity of second-hand locomotives and cars which had been captured by the British during the siege of Sebastopol in the Crimea. This equipment had been built for an extremely broad gauge, viz: five feet six inches. The Argentine Company laid its tracks to accommodate these cars and to this day the five feet six inches gauge is in general use throughout central and eastern Argentine.

During the first year of its existence the little Buenos Ayres to Flores line earned gross \$19,185, its expenses amounting to \$12,448. The road and equipment cost the company \$285,108. To-day it forms a part of the wealthy Buenos Ayres Western Ry. of which more will be told hereafter.

It was not until after the year 1880 that any amount of railway construction work was carried on throughout Argentine. That Republic, which to-day is as settled



Photo by P. S. Penfield.

WAYSIDE STATION ON THE TRANS-ANDINE RY. (ARGENTINA).



Courtesy of Pan-American Union.

**ROUGH COUNTRY TRAVERSED BY CORDOBA CENTRAL RY.
(ARGENTINA).**



Courtesy of Pan American Union.

RAILWAY BRIDGE IN ARGENTINA.



Courtesy of Pan-American Union.

ENTERING THE FOOTHILLS OF THE ANDES,
(ARGENTINE TRANS-ANDINE RY.).

and well governed as practically any country in the world, was, during its early days, frequently torn by revolution and strife. So unsettled were conditions that little or no foreign capital was attracted to the country. Consequently industry remained in a stagnant condition, and railway development was slow in the extreme.

Among the pioneer railway builders in the Republic was the sturdy New Englander, William Wheelwright. This descendant of an old Puritan family was a native of Newburyport, Massachusetts, where he first saw the light in the year 1798. During his long and useful life he figured most prominently in the development of South America, on whose shores (near Quilmas, Argentine), he was shipwrecked in 1826. He was the pioneer of steam navigation on the west coast of the continent and was the founder of the subsequently great and prosperous Pacific Steam Navigation Co. This steamship line, since absorbed by the Royal Mail Steam Packet Co., was financed wholly by British capital, but not until Wheelwright had made every effort to interest Astor, Aspinwall, Vanderbilt and other American financiers of his day in the scheme.

Wheelwright built the first really important railway in Argentine. This line, which to-day forms a part of the Central Argentine Ry. system, extends from Cordoba to Rosario, a distance of 246 miles. Work on the railway commenced in 1863; the first section was opened in 1866 and the road finally completed in 1870.

Among Wheelwright's other accomplishments in Ar-

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gentina was the building of a line from Buenos Ayres to the nearby port of La Plata. He, likewise, was the first to contemplate the building of the Trans-Andine railway to connect Argentine with Chile. He did not live to carry out this undertaking however, his death occurring in 1873. His remains are interred in the cemetery at Newburyport. Although little known in his native country, he has not been forgotten by the Republics in whose interest he accomplished so much. Argentina and Chile have erected magnificent monuments to his memory, while in the two Republics his name is everywhere revered and esteemed.

The magnificent system of railways in operation at the present time throughout the Republic, is well deserving of the universal praise which has been bestowed upon it. The network of lines, spreading as it does through practically all of the developed sections of the country, gives to Argentine's moderately small population, a service second to none in the world. To-day even portions of remote Patagonia are in rail connection with the capital, Buenos Ayres, and it will not likely be many years ere trains will be running direct to the Straits of Magellan.

The most widely known, although not the most important among the railways of Argentina, is the Buenos Ayres & Pacific. Beginning operations in the year 1882, at which time it extended only from Mercedes to Villa Mercedes, it has gradually expanded into a 3,500 mile system. The purpose of the management has been to

make this railway the principal unit of a system to link the shores of the Atlantic with the shores of the Pacific. After many years of striving this purpose has been accomplished and a traveller may now cross the continent (Buenos Ayres to Valparaiso), in two days as compared with an eleven day voyage previously necessary.

The completion of this link was not, however, accomplished without great cost. In order to carry out their plans, the B. A. & P. Ry. found it necessary to acquire working control of the Argentine Great Western Ry. (see a following paragraph). As the stockholders of the latter held out for a long period, the B. A. & P. Ry. was compelled to lease the property (in 1907) on rather high terms.

The B. A. & P. Ry. now operates a direct broad gauge through line from Buenos Ayres westward to Mendoza, 647 miles. At the latter point the passengers for Chile change cars to the meter gauge Argentine Transandine Ry. (leased by the B. A. & P. Ry.) which climbs through the wild gorges of the Andes partially by means of the rack rail system to Las Cuevas, 111 miles beyond Mendoza. Here at an elevation of 10,170 feet begins the tunnel carrying the passenger through the mountain peaks and over the Chilean border. This great tunnel which took several years to complete (opened 1910), is two miles in length and cost a vast sum. Passing through the tunnel, one-half of which belongs to the Argentine Transandine Ry., and one-half to the Chilean Transandine Ry., the narrow gauge line is continued

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down the steep mountain grades for some forty-three miles to Los Andes, Chile, at which point a break in the gauge to five feet six inches occurs. From Los Andes to Valparaiso is about eighty-five miles, and the total distance from ocean to ocean is 886 miles. The first class fare across the continent amounts to about \$63. It is considered one of the greatest scenic trips in the world.

As previously stated, the idea of a transcontinental railway originated with the American, William Wheelwright. In the year 1860, he presented to the Argentine Government plans for the construction of a railway to extend from Rosario, then, as now, the second city in size and importance in the Republic, across the Pampas to the Andes; thence through the San Francisco Pass to the Chilian port of Caldera, some 600 miles to the north of Valparaiso. Sufficient funds were not forthcoming however and the matter was dropped for a period of years.

In the year 1869, John and Matthew Clark were commissioned to connect Argentine and Chile by telegraph. The brothers selected the Cumbre Pass route, and while working their way through the mountains conceived the idea of building a transcontinental railway between Buenos Ayres and Valparaiso.

The Clarks shortly afterwards explained their project to the two Governments and in 1873, at the request of Argentina, surveyed a possible route for the railway. It was found that the building of the railway would re-

quire some heavy engineering, including two miles of tunnelling. It was argued, however, that a far greater amount of traffic could be secured via the direct "Air Line" advocated by the Clarks, than via a railway built through the less difficult passes to the north and to the south, and that a fair return would soon be earned on the cost.

Several years elapsed before any portion of the transcontinental line was completed. In the early eighties the Buenos Ayres & Pacific Ry. completed its main line from Buenos Ayres to Villa Mercedes and at about the same time the Argentine Great Western Ry. began to operate trains between Villa Mercedes and Mendoza. In Chile, the government had constructed an extension of the State Rys. as far eastward as Los Andes, which is about 47 miles from the boundary with Argentine. None of the line across the Andes mountains had as yet been completed, however, and no less than thirty years were destined to pass ere the railheads were to join in the heart of the Andine tunnel.

The task of constructing Argentina's portion of the railway over the mountains was assigned to the Buenos Ayres & Valparaiso Transandine Ry., a company incorporated in 1886. Later the company changed its somewhat unwieldy title to its present one, the Argentine Transandine Ry. Prior to December 31, 1893, 91 of the 111 miles of road on the Argentine side had been completed. During the following ten years only 9 miles additional were opened for traffic. The company, in

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spite of assistance rendered by the government, was continually in financial difficulties, the work proving far more costly than anticipated. In 1900 the original government guarantee was commuted by the delivery to the company of \$6,400,000 Rescission bonds, against which the company allotted to the government £225,000 Deferred Shares, carrying the right to have a representative on the Board of Directors.

On the Chilian side of the mountains, work had progressed at an even slower rate, and it was not until 1906 that the first section of the mountain line, Los Andes to Juncal (32 miles), was opened for public traffic. A description of the Chilian Transandine Ry. will be found in a subsequent chapter.

Finally on April 16, 1910, after 50 years of striving, the Transcontinental line was completed from ocean to ocean and the first train despatched through the great tunnel. This tunnel is, as stated, approximately two miles in length. At the entrance on the Argentine side the altitude is 10,170 feet and at the entrance on the Pacific side, 10,459 feet. At the boundary line between the two Republics, the tunnel is approximately 2,400 feet below the surface.

Prior to the completion of the tunnel in October, 1910, a wagon transportation line was operated between the then existing railheads, carrying the passenger by a winding trail over the Cumbre Pass, 12,605 feet above the two oceans. Near the summit of this pass, no great distance from the boundary, there has been erected a

statue, "Christo Redemptor,"—the Christ of the Andes—moulded from the cannons of Argentina and Chile. This is a token of the peace, friendship and good understanding existing between the two republics, following the settlement some years ago by arbitration of their boundary dispute, a peace which made possible the Transandine Tunnel. On the pedestal supporting this colossal statue of the Christ are inscribed these words: "Sooner shall these mountains crumble into dust than the people of Argentina and Chile break the peace which they have sworn to maintain at the feet of Christ the Redeemer."

The friendship between Argentina and Chile has been maintained, the last link of steel joining the two republics forged and the only transcontinental railway in South America's 7,000,000 square miles, completed.

Destined at no distant days to become mighty countries supporting vast populations alike in race and kinship, Chile and Argentina as trade centres of the Southern Hemisphere will more and more enjoy the benefits of this 886-mile system of railways, which makes the rough 11 days' sea voyage via the Straits of Magellan route no longer necessary.

In 1904 this company acquired under lease the Bahia Blanca and North Western Ry., which operates nearly 900 miles and links the B. A. & P. Ry. with the port of Bahia Blanca. This latter city, destined, it is believed by many, to be the greatest grain shipping port in South America, is situated 534 miles down the coast from

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Buenos Ayres and has a harbor with 28 feet of water, dry docks, grain elevators, etc. Its population is estimated at 80,000.

The Argentine Great Western Ry. of which mention has been made, was, as stated, constructed during the early eighties to form a section of the transcontinental line. In 1887 it was acquired by an English company by which it was operated until April, 1907, when it was leased to the Buenos Ayres & Pacific Ry.

The programme of expansion which the ambitious Buenos Ayres & Pacific Ry. has carried into effect has increased its fixed charges considerably. The guarantees and rentals paid to the stockholders and bondholders of the various leased lines, amount to over \$4,500,000 annually. While these annual expenditures at present prove burdensome to the Buenos Ayres & Pacific Ry., causing at first a reduction in and since the war a suspension of dividends on the ordinary stock, the road's strategic position has been greatly improved, and it is expected that when conditions adjust themselves to normal the stockholders will again receive a fair return on their investment. The railway may be said to be a brilliant example of British enterprise in a foreign land.

Even more important than the Buenos Ayres & Pacific Ry. is the British owned Buenos Ayres Great-Southern Ry. which operates approximately 3,700 miles of line. From a modest beginning of 71 miles in 1865 the system has grown until it is the largest in Argentina. Serving the richest sections of the land, the company



Courtesy Pan-American Union.

ON THE WAY TO CHILE—TRAIN ON ARGENTINE TRANS-ANDINE RY.



Courtesy of Pan-American Union.

PLAZA CONSTITUCION STATION, BUENOS AYRES.
(Buenos Ayres Great Southern Ry.)

350 Passenger Trains arrive or depart daily from this station.

normal year) the railway carried among other freight, 6,592,931 head of live stock, 1,744,572 tons of wheat, 997,182 tons of maize, 836,856 tons of oats, 921,803 tons of lime and stone, 226,417 tons of potatoes and 2,531,595 tons of general goods.

At Bahia Blanca (as stated) and at the nearby port of Ingeniero White, the company has erected extensive docks and terminals. During the harvest seasons an enormous amount of grain is brought to Bahia Blanca for shipment and the company's facilities are taxed to the utmost to handle the traffic.

One of the most important of the numerous branches operated by this company extends from Buenos Ayres, southward to Mar del Plata. This town is the favorite summering place of the wealthy Argentinos and the Newport of South America. Few places in the world exist where more wealth and fashion is displayed. The railway operates a number of palatially equipped trains to and from Mar del Plata and has erected a station at the resort which is one of the most beautiful buildings of its kind in the Western Hemisphere. The density of the passenger traffic between Buenos Ayres and Mar del Plata may be judged by the fact that during the Easter holidays, in a recent year, no less than 106 sleeping cars (24 double berths each car) were run from the former to the latter point during a single night.

Southward and southwestward from Bahia Blanca stretches the great mystery land of yesterday, Patagonia, the fabled home of giant men and the last retreat

of the animals of the pre-historic past. To-day large portions of this territory are covered with sheep ranches, some of which are larger than the State of Rhode Island. It has been discovered that by means of irrigation, a considerable portion of this territory may be made highly productive of wheat and other cereals, fruit, etc. As a result of this discovery the Government is lending its aid to a number of schemes to open up large sections of the country. To further the development of Patagonia the Government is constructing a comprehensive railway system, the tidewater terminal of which will be at Port San Antonio, located in the southern part of the Territory of Rio Negro, on the shores of Gulf San Matias. This railway, which is known as the Patagonia Ry., will also be in direct rail communication with Bahia Blanca and Buenos Ayres, as the Buenos Ayres Great Southern Ry. has surveyed and is to construct, when conditions are favorable, a 175 mile branch line from Darwin on its Nequeen section to Port San Antonio.

The Patagonia Ry., several sections of which are already completed and in operation, extends westward from Port San Antonio to the shores of Lake Nahuel Huapi, a large and beautiful body of water situated a short distance eastward of the Andes Mountains. From Lake Nahuel Huapi the line strikes off in almost a due southerly direction and when completed will pass through the western portion of Chubut and also through the vast and little settled territory of Patagonas. The

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Southern Extension will pass en route the shores of Lake Buenos Ayres and Lake Argentine. The latter lake, until recently but little known and never fully explored, rivals some of the mountain lakes of Switzerland for the magnificence of its scenery and, were it not for its inaccessibility, would be one of the great show places of the Southern Hemisphere. Another extension of the railway will be built westward from Lake Nahuel Huapi up the slope of the Andes, to connect at the summit of one of the passes with the Chilian State Rys.' line to the Pacific port of Valdivia, thus affording another, though a somewhat less important, transcontinental route from the Atlantic to the Pacific.

Along various sections of the railway a number of Land Companies have developed irrigated tracts for settlement. The Patagonia Ry. will handle practically all of the products of these lands, thus assuring it a permanent traffic which will increase year by year. It is estimated that the amounts realized from the sales of lands and the rise in land values will repay the Government for its Patagonian railway investments, although it will likely be some years ere the railway's gross earnings will exceed its operating expenses.

To the south of Port San Antonio, in the Territory of Chubut, is situated Port Madryn which is the terminus of a line known as the Central Ry. of the Chubut Co. This railway extends inland to Trelaw and Gaiman (51 miles), and an extension is under construction, surveyed or projected, to run westward following the course

of the Chubut River for some 200 miles. This will open up a stretch of country which may easily be made productive. The railway at present serves a large and prosperous Welsh colony, which contains several hundred farms and ranches. This colony was established some fifty years ago and its early history presents a record of desperate struggles against starvation and against the privations of the long cold Patagonian winters. The colony, thanks to the perseverance and endurance of the settlers, is now established on a thoroughly sound basis. The traffic enjoyed by this railway is sufficient to enable it to return to its stockholders usually from 6% to 10% annually. A total of £200,000 Railway Company stock is outstanding. Gross Earnings are at present about £40,000 per annum.

Returning to the discussion of the numerous railway lines terminating at Buenos Ayres, mention must be made of the highly prosperous Central Argentine Ry. system. Operating more than 3,000 miles of broad gauge line and earning in normal years in excess of \$30,000,000 gross, this railway has become one of the most prosperous in the Republic. The railway with its equipment, etc., represents an investment of more than \$250,00,000 and has for years returned large dividends to its stockholders. The entire system is most efficiently managed and is maintained in the best physical condition. The main line runs from Buenos Ayres, via Rosario to Tucuman, 720 miles, at which latter point it connects with the Government line running to the frontier with

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Bolivia. There is a second parallel line between Buenos Ayres and Rosario, while numerous branches and extensions have been constructed.

One of the two lines at present operated by the Central Argentine Ry. between Buenos Ayres and Rosario was formerly known as the Buenos Ayres & Rosario Ry. For a number of years the two systems were closely competitive. Finally in the year 1902 an amalgamation plan was agreed upon, which plan however was not finally carried into effect, owing to opposition on the part of the Government, until 1908. The rich territory between Buenos Ayres and Rosario has proven a tempting bait for other railway companies and the two "Central" lines now have to compete for through traffic with the metre gauge Cordoba Central Ry. and to a lesser extent with the more roundabout line of the (metre gauge) Buenos Ayres State Ry. The Cordoba Central Ry. also competes with the "Central's" original main line, which extends from Rosario to Cordoba. This latter line, it will be remembered, was built by the American, William Wheelwright; famous as the founder of the Pacific Steam Navigation Co.

In addition to its terminal at Buenos Ayres, the "Central" owns extensive yards and docks at Rosario. A port, Villa Constitucion, some 32 miles south of Rosario, is being developed by the company. Santa Fe, capital of the Province of Santa Fe, is also a tidewater terminal of lesser importance. The railway enjoys a very heavy passenger traffic and has for several years been engaged

in the construction of a magnificent terminal station at Buenos Ayres, which, it is stated will be the finest station building south of the United States of America. No less than 21,500,000 passengers are carried annually under normal conditions, the total for the fiscal year ending June 30, 1913, reaching 21,721,273, an average of 59,570 per day. About 9,000,000 tons of freight,—largely agricultural products,—and about 2,000,000 head of live stock are likewise handled each year by the railway. To illustrate the growth of this great system during recent years the following table has been inserted:—

	1902-3.	1912-13.	Inc. %
Average Miles Operated.....	2,316	2,994	29.3
No. of Passengers Carried.....	7,070,289	21,721,273	207.2
Tons of Goods Carried.....	3,939,757	9,449,209	139.8
Tons of Live Stock Carried.....	300,932	654,895	117.6
Gross Receipts.....	£2,796,296	£6,489,346	132.1
Net Receipts.....	£1,389,072	£2,770,411	99.4
Train Miles.....	5,042,089	10,314,245	104.6
Accumulated Reserve Funds.....	£643,897	*£2,173,138	237.5

*June 30, 1912; a larger amount on June 30, 1913.

Fourth in size and importance among the railways of Argentine is the Buenos Ayres Western Ry. operating approximately 1,800 miles of broad (5ft. 6in.) gauge railway. This is the oldest line in the Republic, being the outgrowth of the little Buenos Ayres to Flores line which was completed in the year 1857. The railway did not prosper in its early days and fell into the hands of the Government, which in turn sold it to its present British owners. Since 1890, the year in which it passed under British control, the system has expanded greatly and has earned large profits making possible the payment

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of substantial dividends. To-day the road and equipment represents an investment of approximately \$150,000,000.

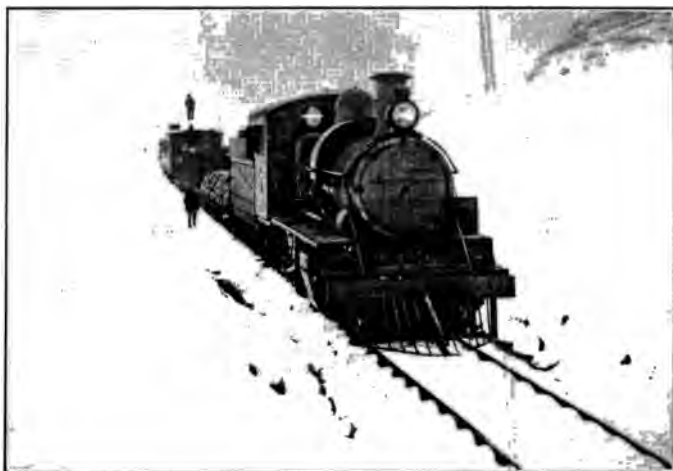
The main line of the Buenos Ayres Western Ry. runs westward about 545 miles, almost paralleling the Buenos Ayres & Pacific Ry., to the town of Colonia Alvear, located in the Province of Mendoza. Three other trunk lines leave the main stem and extend in a westerly and southwesterly direction into the Pampas country. At Buenos Ayres an underground freight line is being constructed from the company's present terminal to the waterfront. This subway will greatly facilitate the handling of the railway's large export and import traffic and should cause a considerable saving in operating costs. Arrangements have also been made whereby the Buenos Ayres Western Ry. will be directly connected with the new passenger subway line of the Anglo-Argentine Tramway Co. which will enable the railway to send its passengers directly into the business section of the city. About 23 miles of line suburban to the capital are being electrified, while a large mileage is being four-tracked. The rapid and continuous growth of the passenger traffic of this company is shown by the fact that it carried during 1912-13 (a normal year) no less than 11,462,842 passengers as compared with 3,694,321 carried during 1905-6. There were also carried during 1912-13, 7,345,845 head of live stock and 2,896,015 tons of freight. The Gross Earnings for the same year exceeded \$14,000,000.



BUENOS AYRES IN 1848.



THE "AVENUE OF MAY." BUENOS AYRES IN 1915.



**TRAIN ON THE PERUVIAN CENTRAL RY., NEAR MORACHOCO;
ALTITUDE 15,865, THE HIGHEST POINT REACHED
BY ANY RAILWAY IN THE WORLD.**



Photo by P. S. Penfield.

***THE CHRIST OF THE ANDES.—COLOSSAL STATUE NEAR THE
TRANS-ANDINE TUNNEL.—MOULDED FROM THE
CANNONS OF ARGENTINA AND CHILE.***

Jointly with the Buenos Ayres Great Southern Ry., the Buenos Ayres Western Ry. leases and operates the Buenos Ayres Midland Ry., which extends from a suburb of Buenos Ayres in a southwesterly direction to Carhue (322 miles), where connections are made with the lines of the two Lessees. The railway is of a 4 ft. 8½ in. gauge and is 322 miles in length. It handles a fair amount of traffic.

Among the railway systems serving the great tract of territory lying to the north and northwest of Buenos Ayres between the Parana River and the Andes Mountains may be mentioned the Cordoba Central Ry., like most of the other Argentinian lines the property of a British company. Although in competition for through traffic with the richer and more powerful Central Argentine Ry., the meter gauge Cordoba Central system has year by year increased its earnings and is today a factor to be reckoned with among the lines serving the great Republic. The railway is about 1,200 miles in length and is capitalized at approximately \$100,000,000 and prior to December 31, 1912, was operated in four sections, viz:—the Cordoba Central Original Line, the Central Northern Section, the Cordoba Central Buenos Ayres Extension Ry. and the Cordoba & Rosario Ry.

The "Original Line" is 128½ miles in length and was formed in 1887 to connect the city of Cordoba with San Francisco, a town situated to the eastward on the boundary between the province of that name and Santa Fe.

This section of the line passes through a large timber belt and also through some wheat lands. This was the first section of the present system to be completed. From this modest beginning the railway has been gradually developed until to-day it extends from Buenos Ayres on the south to Tucuman on the north and passes en route through a number of important cities and towns, including Rosario, Cordoba, La Madrid, Tucuman, etc.

This railway will increase in importance following the completion of certain mileage being constructed by the La Quiaca-Tupiza Ry., in the Republic of Bolivia. The gauge of Cordoba Central Ry. is similar to the gauge of the Argentine Government line running from Tucuman northward to the Bolivian frontier and likewise to the proposed line in Bolivia. Thus through freight and passenger traffic can be handled without change of cars between La Paz and other Bolivian points and Buenos Ayres.

ARGENTINE RAILWAY

This company was formed by the so-called Farquhar-Pearson Syndicate and was incorporated in Maine, U. S. A., in 1912 with a capital of \$45,000,000 (\$15,000,000 preferred and \$30,000,000 common stock). Its charter was a very broad one, empowering it to operate railways, public utilities, oil lands, mines and to promote colonization, etc., etc. The Argentine Ry. leased the Cordoba Central Lines and the Entre Rios Rys. and acquired control of the Argentine North Eastern Ry., the Sante Fe Ry., etc. In all, 3,752 miles of railway were leased or

controlled. Unfortunately the financial crises in 1914 necessitated the appointment of Receivers for this system. Certain of the leases have been relinquished and the future of the enterprise is problematical.

The Entre Rios Rys. (also leased by the Argentine Ry.) operates a line from Zarate on the River Plate 168 miles from Ayres via ferry to Ibicuy (49 miles) Buenos and from the latter point to Concordia in the Province of Entre Rios, with several branches and extensions. This line forms part of a direct through route between Buenos Ayres and Ascuncion, the capital of Paraguay. Through passenger service via this railway and via connecting lines (Argentine North Eastern Ry. and Paraguay Central Ry.) was established between these two points October, 1913. It is expected that the ferry route across the Parana River will be shortened from forty-nine miles to eighteen miles, and that the company will secure improved terminal facilities in Buenos Ayres. The tracks of the Cordoba Central System will be used and the latter railway will construct a third rail owing to the difference in the gauges of the two lines. Buenos Ayres Central Ry. tracks are at present used between Zarate and Buenos Ayres.

The average mileage operated in 1912-13 was 730 miles and the gross earnings were \$3,055,727 (\$4,187 per mile) and the surplus \$1,096,852; the capitalization is \$36,939,895 represented by ordinary and preference stock and debentures.

The Argentine North Eastern Ry. is 780 miles in

length and forms the middle link in the through line from Buenos Ayres to Ascuncion, Paraguay. A car ferry is operated between the latter republic and Posadas, the northern terminus of this road. The capitalization (stock and debentures) in 1913 totaled \$29,803,643 and the gross earnings, \$1,835,123.

The Sante Fe Ry. (formerly controlled by the Argentine Ry.) runs parallel with the Paraguay River from Rosario via Sante Fe into the Chaco country. It is to be extended to Ascuncion. It is a fairly profitable line, 1,060 miles long and is under French management. Its net earnings for 1912 (not including other income) were about \$2,100,000, its capitalization being approximately \$42,000,000.

There are a number of smaller lines in the Republic which will not be described here. Among them are the Rosario-Puerto Belgrano Ry., which crosses most of the important railways running out of Buenos Ayres. It is a broad guage line and extends from Rosario to near Bahia Blanca (about 500 miles). Although capitalized at about \$30,000,000 it handles but little business and is now in Receivers' hands.

The Buenos Ayres Central Ry. (175 miles) the stock of which is mostly owned in Argentine. Other more or less important lines include the Buenos Ayres Midland (322 miles), recently leased by the Buenos Ayres Great Southern Ry. and by the Buenos Ayres Western Ry.; the Province of Buenos Ayres Ry. (about 785 miles operated) and the La Plata & Merdiano Ry. (120 miles)

narrow gauge lines owned by the Province of Buenos Ayres. The Government lines, most of which are located in thinly settled districts, are operated at a heavy loss. The principal of these Government lines, the Central Northern Ry., extends from Santa Fe in a north-westerly direction to La Quiaca, on the boundary with Bolivia. The metre gauge is used and a number of heavy grades are encountered, necessitating a large amount of heavy engineering work, and on one section of the line about six miles of rack rail. The line climbs to an altitude of about 11,600 feet. The railway, with branches, comprises about 1,500 miles and cost approximately \$58,000,000 gold. Gross earnings for 1913 were approximately \$4,600,000, an amount not equal to operating expenses.

Taken as a whole, railway investments in Argentine are established on a sound basis.

CHAPTER II

CHILE AND BOLIVIA.

PROSPERITY OF THE TWO REPUBLICS—RAILROAD BUILDING IN THE
ANDES—WHEELWRIGHT, GREENE AND MEIGGS, AMERICAN EN-
GINEERS, AND WHAT THEY DID FOR CHILE—THE ARICA-
LA PAZ RY., A GREAT CONSTRUCTION FEAT—THE
ANTOFAGASTA AND BOLIVIA RY., THE SECOND
HIGHEST LINE IN THE WORLD—THE BOLIVIA
RAILWAY, AMERICAN BUILT—THE CHIL-
EAN TRANSANDINE RY. AND THE
TWO MILE TUNNEL.

WHEN Nature moulded into being the great Continent which millions of years later came to be known as South America, the stretch of territory to-day called Chile was left with a profile as rough and rugged as any country on earth. It is not strange therefore that the building of a comprehensive network of railway lines in that Republic has been long delayed.

Chile stretches from the boundary with Peru, in the tropics at the north, southward for 2,625 miles to Puente Arenas, the most southerly town in the world, Tierra del Fuego and stormy Cape Horn. If one sailed from the coast of Labrador southward to the Guianas in South America he would cover no greater distance than if he had followed this length of the Chilean Coast.

Chile's coast line, however, is 23 times greater than its average breadth, its area being about 292,000 square miles.

Its 3,500,000 inhabitants make up one of the hardest and most progressive races in the Western Hemisphere.

The two greatest cities, Santiago and Valparaiso, boasting 400,000 and 250,000 inhabitants, respectively, are centers of culture, art and learning second to none of the cities of Latin America.

This nation's greatest wealth is in its mineral products, nitrate taking the lead. During the century 1810 to 1910 the mineral production of the Republic has been estimated as follows:

Nitrate.....	*\$1,225,300,000
Copper.....	664,292,000
Silver.....	298,695,000
Coal.....	114,516,000
Gold.....	68,084,000

*Since 1830 only.

Large quantities of borax, salt, iodine, sulphur, iron, manganese, cobalt, etc., are also taken from the earth. The iron mines at Tofo (near the Pacific Coast, about 30 miles north of Coquimbo), owned by the Bethlehem Steel Corporation, are estimated to contain 185,858,000 tons of 69% ore. It is stated that this ore can be placed aboard ship at less than 20 cents a ton.

Chile's exports for 1913 totalled \$144,653,312 (including \$126,988,675 mineral products), as against imports totalling \$120,296,510. During the last three years the commerce between that country and the United States has increased \$15,000,000 and the U. S. is steadily gaining on its two leading rivals, Great Britain and Germany. Since the outbreak of the European War the exports from Chile have shown a considerable decrease. The Republic's industries were temporarily demoralized and

the ability of the country to ride the storm speaks volumes for its financial strength and integrity.

The Republic contains about 4,000 miles of railway, about 2,207 miles being owned by the Government. The 1,860 miles of privately owned railways are valued at \$93,066,583.

The Government is carrying out an extensive railway programme and is expending millions annually on its lines (\$19,400,000 in 1912). Using Valparaiso as an operating base the so-called "Longitudinal System" projected in the year 1908 by the then President of the Republic, the late Don Pedro Montt, is completed, building or projected to Arica in the far north and to Puerto Montt on the Corcovado Gulf, some 800 miles to the south. This latter section has already been completed, while the northern portion of the line has been opened to a point beyond Iquique. The total system will be 2,132 miles in length (1,960 miles completed to December 31, 1913). There are also cross lines—operated by the Chilean State Rys.—including the important one running from Valparaiso to Los Andes, where it meets the Chilean Transandine Railway, which joins the Argentine Transandine Railway at the heart of the Andes, forming with connections a through route from Valparaiso to Buenos Ayres.

Chile first placed herself on the railroad map in 1849, in which year the New Englander William Wheelwright—whose history may be found in the chapter on Argentine Republic—completed the construction of a



Photo by P. S. Penfield.

SCENE AT TALTAL, CHILE, TERMINUS OF TALTAL RY.
 (Note how mountains dip abruptly almost into sea.)



Courtesy of Pan-American Union.

HIGHEST VIADUCT IN THE WORLD—LOA RIVER, CHILE.
ANTOFAGASTA (CHILE) & BOLIVIA RY.



Courtesy of Pan-American Union.

THE ARICA-LA PAZ RY.

This Railway runs through a Treeless, Waterless Country from the Pacific Coast to the Bolivian Plateau.



Courtesy of Pan-American Union.

RAILROADING IN MOUNTAINOUS CHILE.

line from the port of Caldera to the coal mines at Copiapo. This is the oldest existing railroad in Latin America, and, with the exception of the Demarara Ry. is the oldest in South America.

Chile has not forgotten Wheelright's services and, like Argentina, has erected a handsome monument to commemorate his achievements.

Not long after the completion of the Caldera to Copiapo line, Wheelwright, together with another American, Allen Campbell, surveyed a through line between the port of Valparaiso and Santiago. A few years later construction work was commenced under the supervision of Samuel Ward Greene of Rhode Island. The line was completed in 1863 by Henry Meiggs of Catskill, N. Y., whose remarkable career in South America will be discussed in the chapter on Peru, in which Republic he made himself famous by the construction of the Oroya Ry., the highest line in the world. The Valparaiso to Santiago line, to-day the main section of the Chilean State Rys., is a splendid example of Yankee genius. The construction work throughout was extremely difficult owing to the rugged country traversed. It is said that when Meiggs took over the contract to complete the road—this was late in 1861—it was stipulated that the line must be completed in three years. A fine of \$10,000 per month was to be paid by Meiggs for each month's delay in the completion of the railway; likewise he was to receive \$10,000 for each month gained, in carrying out the contract. With the assistance of about

60 American engineers (among them Henry Thorndyke who completed the Oroya Ry. in Peru, following the death of Meiggs in 1877) and about 10,000 workmen, Meiggs completed the undertaking in less than two years, thereby gaining a large bonus.

At the present time express passenger trains make the trip between Valparaiso and Santiago in about five hours. Express trains carry American chair cars and Pullman sleeping cars. Passenger and freight rates are somewhat more reasonable than on most South American railways. Despite the heavy traffic the railway, like most similar enterprises operated by Governments, is run at a heavy annual loss.

The Government railways have shown deficits annually for the past few years, in spite of freight and passenger rate advances averaging over one-third. The deficit for 1913 was \$2,732,596. The privately owned lines show a large profit.

The completion of the Panama Canal will mean much to this Republic, which has not been slow to grasp the fact and which is making every preparation for the expected increase in trade. About \$13,000,000 is being expended on extensive port works at Valparaiso, while upwards of \$20,000,000 it is expected will be spent on the more northerly ports such as Antofagasto, Iquique, Patillos, Pisagua, etc. A vast amount of American capital is being invested in Chile, principally in its mines, and more is to follow.

Before dealing further with the railway lines of Chile mention must be made of Bolivia.

At the end of 1915 there were in operation in this Mountain Republic only about 850 miles of railway. An additional 350 miles were being built while about 1,800 miles were projected. Bolivia, in area is estimated from 473,560 to 708,195 square miles, equal, if the latter estimate is correct, to over 14 times the size of New York State or $2\frac{2}{3}$ times the size of Texas, and has a population of only about 2,300,000. The country has wonderful mineral resources, there being a vast developed and undeveloped wealth of copper and tin, while silver has been mined for centuries.

Tin forms the country's principal export, \$23,432,658 of that mineral being shipped abroad in 1912. The total exports for 1913 were \$36,551,390 and the imports \$21,357,505. The United States is not an important factor in Bolivian trade.

Following the coast of Chile southward from the Peruvian line, the first port reached is Arica. This town (population about 3,000) boasts of a fair harbor. Tidal waves, earthquakes and a notable and bloody engagement during the war with Peru have figured in its history. Two railways, the Arica & Tacna Railway and the Arica-La Paz Railway, have their terminals at the port. The former runs through a barren country to Tacna (population 10,000), some 40 miles away, the outlet for a rich valley. This railway was to have been extended to La Paz, Bolivia, but the opportunity has been

lost, owing to the construction of the Arica-La Paz Railway. The company, however, pays a nominal dividend to its British stockholders.

The Arica-La Paz Railway is owned by the Chilean Government, although Bolivia is paying, by means of a 3% annual sinking fund, for the portion of the line within its boundaries. The railway, 248 miles in length (129 miles in Chile), is the shortest of the three lines from the Pacific to La Paz. It cost over \$15,000,000 to build and is spoken of as a railway of a thousand wonders.

From Arica the line strikes off northeasterly and soon begins its climb through a barren, waterless waste, towards the top of the Andes. So rugged is the country traversed that the engineers when surveying the line were frequently compelled to blast a trail out of the solid rock, in order to advance up the mountain side. Innumerable hardships were suffered by the builders of the road. The temperature usually registering at from 95 to 100 at noon would frequently drop after nightfall to below zero. No drinking water, food or fuel could be found; these had to be brought from a great distance. Engineering difficulties were met with everywhere. Many tunnels had to be bored through mountain spurs and numerous bridges thrown over ravines. Where the grades are the steepest, and along one section of the line the rise is 3610 feet within a distance of 25 miles, the Abt rack system was put into use. About 28 miles of this rack rail is used on the main line this constituting

the longest continuous stretch of rack rail in the world. 5,000,000 cubic meters of earthworks were also required in the construction of the line. The railway crosses the divide at an altitude of about 14,108 feet.

The last spike was driven in 1913, and the running time from La Paz to the sea has been shortened by half-a-day. A tri-weekly passenger train in each direction was in operation in 1914. Sleeping cars are carried and it is expected that train service will be bettered shortly. Freight traffic though light, is increasing. A branch recently constructed to the Corocora Mining District will bring new tonnage to the road.

Southward from Arica are the three nitrate ports, Pisagua (population 6,000), Iquique (population 45,000) and Paitillos, all of which are terminals of the Nitrate Railways, a prosperous British-owned system, operating about 377 miles of main track and spurs, traversing a large portion of the nitrate belt. Iquique, the principal port, is a town where rain never falls. The place is quite up-to-date, however, boasting of tramways, electric lights, etc., but its harbor is a miserable one. In spite of this, nevertheless the exports from Iquique are the largest of any port in Chile.

The Nitrate Railways had outstanding December 31, 1912, about \$9,145,000 stock and \$2,992,000 bonds. Dividends of 7% and 7½% were paid on the preferred and ordinary shares, and the receipts for 1912 were \$3,426,630.

Inland from Tocopilla the next port southward runs

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the railway owned by the Anglo-Chilian Nitrate & Ry. Co. This line profitably handles a large export traffic. The Company is a prosperous one and usually pays from 20% to 30% on both preferred and ordinary stocks.

The next ports worthy of note are Mejillones and Antofagasta, the tidewater terminals of the Antafagasta (Chile) & Bolivia Railway, the most important privately owned railway in Chile and Bolivia and one of the best paying lines in South America. From the two above-mentioned ports over one-fourth of Chile's nitrate production is annually exported. Mejillones, although it has an excellent harbor as compared with the open roadstead (Morena Bay) at Antofagasta, is outranked in importance by the latter place.

The Antofagasta (Chile) & Bolivia Railway affords access to some of the finest mountain scenery in South America. The railway itself is but 2 ft. 6 in. gauge, and yet its trains run at very fair speed over a well maintained roadbed.

The main line starts at Antofagasta, which is 590 miles north of Valparaiso. A semi-weekly through passenger train carrying sleeping and dining cars is operated, making La Paz, Bolivia (about 720 miles), in approximately 45 hours. Mixed trains are also operated. The freight cars used by the company will carry a 20-ton load.

The railway's climb begins as soon as it leaves the Pacific, rising 1,800 feet in the first 18 miles. After crossing the Longitudinal (Government) Railway,

60 miles from the sea, the main line enters the great nitrate belt, through which it extends for over 30 miles. A total of 1,020,497 tons of nitrate and nitrate earth were carried by the railway in 1913.

Climbing ever upwards the railway crosses the Loa River and reaches Calama (148 miles from the sea) where the altitude is 7,400 feet. This ancient town has been a great copper mining center since the days of the Incas. At Conchi, about 32 miles beyond Calama and at an altitude of nearly 10,000 feet, the Loa River is re-crossed by a viaduct, said to be the highest in the world. The viaduct is composed of six steel lattice girder spans of 80 feet each, supported on steel trestle towers, the track being 336 feet above the torrent.

At San Pedro, 33 miles beyond Calama, the A. & B. Railway has constructed a vast system of reservoirs, costing about \$5,000,000, to supply fresh water, (about 6,000 tons daily) to the nitrate fields and to Antofagasta, 193 miles away.

Climbing along the mountains past the great snow-capped volcanoes "San Pedro" and "San Pablo" (the former active), cutting its way at one point through a bed of lava over 500 yards in width, the railway reaches Ascotan, the summit of the divide, 13,000 feet above the Pacific. As the line descends towards the Bolivian frontier, it passes a lake of borax, 24 miles long, the largest of its kind in the world.

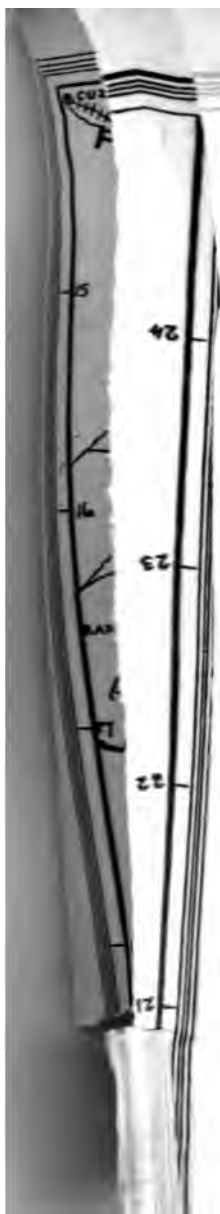
From Ollague, 270 miles from Antofagasta, a 60-mile branch extends to the Collahuasi Copper Mines, reach-

ing the altitude of 15,809 feet, which is 28 feet than the summit of Mount Blanc, the apex of Eu

Entering Bolivia, 5 miles beyond Ollague, the runs northward over a vast plateau to Uyuni, Ri ato and Oruro. At Uyuni a 20-mile independence way, which runs to the Huanachaca Silver Mines, the A. & B. Railway. The short line was a most one to build, as a tunnel two miles in length had driven through the mountains before the right-c could be laid out. At one time the Huanachaca M Co. controlled the Antofagasta & Bolivia Ry.

From Rio Multao, 445 miles from the Paci branch line owned by the Bolivia Railway (an A can company) which is leased by the A. & B. Ra runs to Potosi, 108 miles away. To reach this a city, which flourished long before John Smith l on the shores of Virginia, tracks had to be laid up high an elevation as 15,814 feet—the second hi altitude reached by any railway in the world. Postosi section, over which a semi-weekly mixed service is maintained, has been surveyed to Sucre former capital.

The A. & B. Railway's main line continues northw passing the mysterious Lake Poopo, 50 by 30 mile size and navigable for steamers, which receives 212 cubic feet of water per minute and discharges thr known outlets only 2,000 cubic feet during a sin period. The terminal, Oruro, a city of 20,670 inl tants, is soon reached. Here the passenger en rout



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La Paz, 145 miles away, changes to the broader gauge Bolivia Railway (leased by the A. & B. Railway) which continues on to Viachi (126 miles). The last stretch of 19 miles is covered by the Guaqui-La Paz Railway, owned by the Peruvian Corporation. The A. & B. Railway had practically completed at the time of this writing a line of its own between Viachi and La Paz.

The famous old city of La Paz (population 75,000)* is located in a valley about 12,780 feet above the sea. It is the highest capital in the world, overtopping Lhasa, the far-famed capital of Tibet in Asia, by several hundred feet.

The Bolivia Railway was incorporated in the United States in 1907, and holds a perpetual concession from the Republic of Bolivia for the construction of lines of railway in that Republic—in all about 773 miles. This mileage includes the line from Oruro, the northern terminal of the Antofagasta & Bolivia Railway, to Viachi, 126 miles (see above). \$6,237,345 had been expended on the Oruro-Viachi line to December 31, 1913. The Bolivia Railway has also completed building or has projected lines as follows: (1) from Oruro to Cochabamba (132 miles), on which \$10,820,900 had been expended to December 31, 1913; (2) from Rio-Multaõ to Potasi (106 miles), on which \$8,052,575 had been expended to December 31, 1913; (3) from Uyuni (on the A. & B. Railway) to Tupiza, \$2,564,944 expended to December 31,

*La Paz was founded in 1548 by Captain Alonso de Mendoza. Prior to the Spanish Conquest the site of the city had been occupied by the Inca town of Chukiyapa, which dated its existence back to the year 1190.

44 RAILWAY EXPANSION IN LATIN AMERICA

1913; (4) from La Paz to Puerto Pando; (5) from Potasi to Sucre (the capital), etc. These various lines, when completed, will give a comprehensive railway system to Bolivia, and will greatly aid in opening up the vast resources of that Republic.

Of the Bolivia Ry. lines mentioned above, the Oruro to Cochabamba line presented the most difficult construction problems.

The gross receipts of the Antofagasta (Chile) & Bolivia Railway for 1913 were approximately \$9,800,000. The company had outstanding December 31, 1913, \$20,500,000 debenture stock and \$10,000,000 each of preference, preferred ordinary and deferred ordinary stock. Dividends of 5%, 6% and 11%, respectively, were paid on the three classes of stock from the profits for the year 1913. In 1914 and 1915, owing to the effect of the European War on the nitrate traffic, earnings were considerably less than in 1913.

Mention has been made of the Guaqui-La Paz Railway, a 58-mile line controlled by the Peruvian Corporation. This railway extends from La Paz to the shores of Lake Titicaca, the highest lake in the world (elevation 12,500 feet). Here a fleet of steamers owned by the Peruvian Corporation is operated, connecting at Puno, Peru, with the Corporation's Southern Railway of Peru, running lines northward to Cuzco and westward to Mollendo on the Pacific Ocean. The Guaqui-La Paz Railway is 59 miles in length. Its gross earnings for 1912-1913 were \$439,605 (\$7,457 per mile).

In August 1915, the Bolivian Government let a contract to the Vezin Syndicate of Paris to build a line from Tupiza on the Bolivia Ry. to La Quiaca on the frontier with Argentine (60 miles). This railway will cost between \$4,000,000 and \$4,500,000 and will form a connecting link between the Bolivia Ry. system and the railways of Argentine, thus placing La Paz, Oruro and other Bolivian cities in direct rail connection with Rosario and Buenos Ayres. The Republic of Argentine will furnish certain of the construction materials. The La Quiaca-Tupiza route is covered at present by a wagon transportation line. Accommodations at hotels, etc., are so wretched that the route is generally avoided.

To the southward of Antofagasta there are a number of small railways such as the Taltal Railway, Coropaco Railway (built 1851, by William Wheelwright), Arauco Railway, etc. The Taltal Ry. is about 184 miles in length. Its earnings in normal years exceed \$1,500,000 or over \$8,000 per mile, nitrate being the principal commodity handled. £900,000 stock and about £215,000 debentures are outstanding and dividends have usually varied from 6% to 9% per annum. The line commenced operations in 1882. Southward of Puerto Montt, on the Island of Chiloe, there is a 60-mile narrow gauge line, which is opening up the riches of this sparsely settled island. There is no railway worthy of the name on the mainland between Puerto Montt and the Straits of Magellan.

This chapter would not be complete without a de-

scription of the Chilian Transandine Railway, one of the most colossal of man's achievements. This section of the 886-mile "Buenos Ayres to Valparaiso Overland Route" extends from a junction with the Chilian (Government) Railways at Los Andes to the heart of the two-mile tunnel which crosses the divide between Chile and Argentine, joining the Argentine Transandine Railway at the boundary line.

Los Andes is 88 miles from Valparaiso, and here the passenger from the latter city or from Santiago must change cars, owing to a break in the gauge. The altitude here is 2,723 feet and this is the lowest portion of the 43 miles of iron trail which finds its way to an altitude of 10,459 feet ere it enters the heart of the mountain to emerge on the Argentine slope. It is a wild and wonderful country through which this railway gropes its way. Precipitous cliffs, ponderous crags and deep gorges abound, while occasionally a roaring current is spanned. At one point as the railway follows the trail which has been hewn along the mountainside above the Aconcagua River, it enters a tunnel through a spur and a short distance further on emerges on the brink of a great chasm, known as the "Soldier's Leap." Across this chasm and 200 feet above the stream, a bridge has been thrown to a ledge blasted out of the opposite cliff sides. The grade for the last 7 of the 43 miles of railway averages 8%, the rise in this 7-mile stretch being over 3,000 feet. On the entire line there are 118 bridges, 25 tunnels and about 20 miles of rack rail. Snow and

avalanche sheds are frequently necessary, as the railway has to contend with mighty storms during the winter, blockades being very frequent. Therefore it is not surprising that freight and passenger rates are high, and freight train capacity limited.

The Chilian Transandine Railway, which is British owned, is capitalized at about \$347,000 per mile; \$7,500,000 stock and \$7,425,000 debentures. The interest on the debentures is advanced by the Chilian Government under agreement, owing to the present inability of the company to earn its charges. Gross receipts for 1911-12, were \$431,400.

In spite of the traffic interruptions throughout the winter season a total of 9,169 first class and 7,150 second class passengers were carried across the continent during 1913-14. The transcontinental freight traffic is not large owing to the comparatively high rates necessarily charged shippers and to the fact that neither Chile or Argentina are manufacturing countries. Likewise the various breaks in gauges necessitates an excessive amount of loading and unloading, and the heavy grades encountered along the route makes the operations of freight trains extremely costly; thus the railway is hardly able to compete with the all-water route other than for passenger traffic.

CHAPTER III

PERU.

DIFFICULTIES OF RAILWAY CONSTRUCTION IN PERU—HENRY
MEIGGS OF CATSKILL, N. Y., AND THE OROYA RY., THE
HIGHEST LINE IN THE WORLD, 15,865 FEET—
THE RAILWAY TO CUZCO AND LAKE TITI-
ACA—THE PERUVIAN CORPORATION.

PERU, the land of the Children of the Sun, has an estimated area of 680,000 square miles and a population of approximately 4,500,000. Along the Republic's entire 1,000 miles of sea coast is an arid sandy plain, to the eastward of which the mighty Cordillera of the Andes rises mountain above mountain culminating in giant peaks, capped with snow in spite of a blazing equatorial sun. Between these peaks and crags are many precipitous chasms frequently reaching so great a depth as to exclude the light of the day. "These crevices are so deep," says Humboldt, "that if Vesuvius (3,948 feet) or the Puy de Dome (in France—altitude, 4,806 feet) were seated in the bottom of them, they would not rise above the level of the neighboring Sierra."

Eastward of the divide, which forms as it were the backbone of South America, is a great plateau in which nature has stored the treasures of the earth such as gold, silver, copper and other mineral products. Beyond this plateau, the eastern slope of which is capable of considerable cultivation, are to be found great tropical forests, vast tracts of which are as yet practically

unexplored. These forests contain rubber, cocoa and other products of the equatorial lowlands.

In order to make possible a line of communication between the Pacific shores and the highlands, the Incas or their predecessors without aid of explosives cut wonderful pathways, often through great boulders, up the steep Andine slope and pioneered, though they knew it not, the trails to be followed hundreds of years later by the railway.

In 1915 there were only 1900 miles of railway in operation throughout Peru, although nearly 3,000 miles were under construction or projected. The development of this country has been greatly retarded by the lack of railway facilities; the limited development of the railways is accounted for largely by the rugged nature of the country.

Most of the railway mileage of Peru is controlled by the Peruvian Corporation, which was formed in 1890 by the holders of the external debt of this Republic (it having defaulted in interest payments, etc.). The plan was that the holders of the £51,423,190 obligations would receive from the Government all the railroads for a term of sixty-six years (since extended to eighty-three years), together with mining privileges, land grants, etc. In return the bondholders were to deliver over to Peru one-half her obligations abroad, and look to Chile for a settlement of the other half. Chile settled by paying a large sum derived from the sale of guano. The bondholders agreed to finish a number of

railway lines which were then uncompleted, and they were granted the right of free navigation on Lake Titicaca; also 3,000,000 tons of guano, and the sum of £80,000 per annum for thirty years from October, 1893. The latter annuities are secured by the proceeds of the Custom House at Callao and payments are being made regularly.

The principal railway taken over by the bondholders was the Oroya or Central of Peru Ry., "the highest line in the world." This line, the history of which serves as an illustration of the difficulties of railroad building in Peru and the adjoining countries, was begun in 1870 by an American,* Henry Meiggs, whose intention it was to have the road cross the Andes and reach some port on the Amazon. This railway starts at the port of Callao, and in a distance of 106 miles surmounts an elevation of 15,865 feet (Mount Blanc in the Alps is 15,781 feet high). After leaving Callao the line passes Lima and starts to climb until it reaches Chosica, a famous health resort, thirty-three miles from the starting point (altitude, 2,700 feet). About fourteen miles further on is San Bartolome (height, 5,000 feet), near which place a "V-switch," the first of its kind ever tried, is in use. This is necessary, as

*Henry Meiggs was a native of Catakil, N. Y., his birth occurring in the year 1811. As a young man he was unsuccessfully engaged in business, both at Boston and New York. He went in charge of a lumber schooner to California in the gold rush of '49 and soon became prominent in the affairs of that territory. Becoming involved in certain financial misadventures during the year 1857, he left the country and went to Chile and later to Peru. His energy and genius soon made his name a by-word along the west coast of South America, and he soon accumulated a fortune, enabling him to pay back with interest all who had lost through his financial transactions. The Oroya Ry., the eighth wonder of the world, stands as a lasting memorial to his genius.

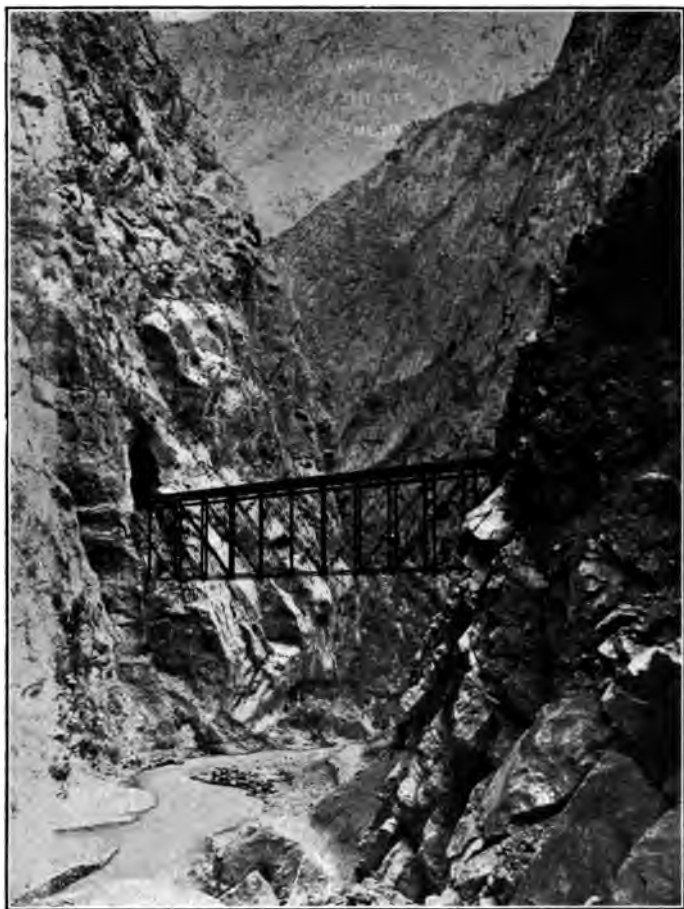


Photo from Pan-American Union.

INFIERNELLO BRIDGE, CENTRAL RAILWAY OF PERU.

tain seasons there rushes a raging torrent. The central pier—there are three piers supporting this viaduct—is of solid masonry and measures fifty feet square at the base. The spanning of this gorge cost hundreds of lives, mostly through the outbreak of a disease known as the “Verrugas fever.” Beyond the Cuesta Blanca Tunnel the line zigzags its way until Chicla, eighty-seven miles from Callao, is reached, at an altitude of 12,215 feet. The thirty-four miles from the tunnel to this town is a dizzy climb along narrow ledges intersected with bridges and tunnels. Along this stretch of track Meiggs performed another wonderful engineering feat. The railway at one point tunnels a high mountain crag to emerge at the brink of a ravine, at the bottom of which a stream rushes. On the other side of the ravine another mountain peak had also to be tunneled. Across the chasm there was built out from the two tunnels a bridge, known as the Infiernello (Hell) Bridge. The sharp cliffs forming the sides of the chasm extend so high above the railway that they almost exclude the light of day. The men who performed the task of building the bridge had to work suspended in baskets let down from ledges above. The line then proceeds through scenes of wild grandeur until Chicla is reached. The amount of blasting required in laying out the right of way necessitated the use of over 500,000 pounds of explosives per month, and over 8,000 men were at times employed in the building of the road. When Chicla was reached in 1877, Meiggs died, his death being due to overwork and

the great strain connected with planning the enterprise. The Government's treasury was then running low and work ceased, not to be resumed until 1891, when the Peruvian Corporation took over the railway. This corporation let a contract to complete the line to William Thorndike (like Meiggs, an American), who continued along the surveys marked out by his predecessor, until the maximum point of the main line, at the great height of 15,665 feet, was reached. A short branch was also constructed to Morochoca, which reaches the height of 15,865 feet, the greatest altitude reached by any railroad in existence. At a point 106 miles from Callao, and at an altitude of 15,665 feet above the Pacific Ocean, a tunnel (the highest in the world) 3,855 feet in length had to be cut through a mountain peak forming a part of the continental divide. This is located in the regions of almost perpetual snow. From the eastern portal of this—the Galera tunnel—the railway begins its descent to the terminal at Oroya, about thirty-one miles beyond. This town, a place of some importance, is about 12,178 feet above the level of the sea, is the junction of an extension to Huancayo, and is also the starting point of the Cerro de Pasco Ry.

The building of this line through the wildest fastnesses of the Andes, cost, it is estimated, fully \$200,000 per mile and not less than 7,500 lives. The undertaking was one of the greatest engineering feats of modern time.

The heavy mortality was due to many causes such as landslides, which were of frequent occurrence,

accidents from explosions, sirroche (mountain sickness), fevers due principally to deposits of rotten granite, etc. On one occasion a most curious accident occurred. A plumber was hard at work mending a leak in a water pipe while a train of mules carrying a load of blasting powder was being driven by. One of the mules brushed against the plumber, who apparently not being in the best of humor just at that moment, struck at the animal with his soldering iron. The result was a decidedly unexpected one, as the hot iron coming by accident into contact with one of the powder bags caused an explosion which sent the mule train and its drivers, several workmen and the unfortunate plumber far over the precipice and into kingdom come.

In addition to the main line and Morochoca branch, heretofore described, the "Central" operates a line between Lima and Ancon (twenty-four miles).

The gross receipts of the Central of Peru Railway for 1912-13 (249 miles operated) were \$2,539,045 and the net receipts \$938,890. In 1913-14 and in 1914-15 gross receipts were \$2,895,275 and \$1,809,185 respectively and net receipts \$1,065,445 and \$625,185.

Of scarcely less importance to the Republic is the Southern Ry. of Peru, which winds its way up the Andes from Mollendo on the Pacific to Lake Titicaca and to Cuzco. Mollendo has a poor harbor and a population of only about 5,000, yet it is the great shipping place for the tablelands of Southern Peru and the region about Lake Titicaca.

After leaving Mollendo this railway strikes southward for several miles following the shores of the Pacific to Majia, a seaside resort, from which point the course followed is west to northwest. The railway trails its way upwards through mountains of wonderful scenic grandeur, until at a point 107 miles from Mollendo, the city of Arequipa is reached, at an altitude of over 7,500 feet. This city, second only to Lima in size and importance, is credited with a population of about 40,000. Here are located the Harvard Observatory, a magnificent cathedral, and in addition many other places of interest. Daily trains with parlor cars attached are in operation between Arequipa and the coast.

Beyond Arequipa the traffic becomes lighter, but it is still sufficient to pay, and a semi-weekly passenger train service is maintained to connect the Pacific Steam Navigation Company's steamers from Callao and other points with the interior. The line after leaving Arequipa resumes its upward climb, following the trails of the Incas marked out previous to the Spanish Conquest, until Juliaca is reached, the junction of the branch to Lake Titicaca. From this point (about 307 miles from Mollendo) the railway follows the tableland northward, passing among other places the towns of Tirpata, Santa Rosa and Sicuani, and climbing through the passes of La Roya (altitude, 14,518 feet) and Crucero (altitude, 14,666 feet) to Cuzco (206 miles from Juliaca). The country about the latter city is, owing to irrigation, highly productive and the railway which has

but recently been completed to this section should greatly assist in its wider development. Cuzco itself has a population of about 25,000 and is probably the oldest city of South America, having been the capital of the ancient Peruvian Empire. This new extension earned about .08 per cent. on the cost of construction during 1912-13.

The Lake Titicaca branch extends to Puno at the northern end of the lake (twenty-nine miles from Juliaca), from which place a line of steamers, some of 1,000 tons register, operated by the Peruvian Corporation, runs across to Guaqui on the Bolivian shore. Lake Titicaca, the highest large body of water in the world, is 12,450 feet above the sea level, is 165 miles in length and has a maximum width of sixty miles, its area being 4,000 square miles.

The running time from Mollendo to La Paz, via Juliaca, Puno, the Lake Titicaca steamer route and the Guaqui-La Paz Ry. (Guaqui to La Paz, Bolivia) is twenty-nine hours.

The Southern Ry. of Peru operated at June 30, 1915, 533 miles of main track (gauge four feet eight and one-inches), this being the longest line in Peru. An extension is proposed to the Madre de Dios River, which runs into the Beni River, an important tributary of the Amazon. The gross earnings for 1912-13 were \$1,783,370 and the net earnings, \$664,833, of which \$640,015 was paid to the Peruvian Corporation, the owner of \$11,114,000 "Southern" stock.*

*The Southern Ry. earnings for 1913-14 and 1914-15 were gross, \$1,818,128 and \$1,158,169 respectively; net, \$647,489 and \$332,717.

The net revenues for 1912-13 from the operation of steamers on Lake Titicaca were \$151,480. Some of the steamers operated are of important size, and all of them are owned by the Peruvian Corporation.

The other railways controlled by the Peruvian Corporations will be described briefly in the following paragraphs:

The Trujillo Ry. connects the interior town of that name (called Trujillo after the birthplace of Francisco Pizarro, population about 12,000), with the port of Salaverry, an open roadstead protected by jetties, situated about 250 miles northward of Callao. Near Trujillo are located the ruins of the ancient Inca city Chanchan. The railway has been extended inland some distance beyond Trujillo, its total length being over fifty-three miles. Gross earnings for 1913-14 were \$324,483 (\$257,525, 1914-15) and net receipts, \$122,534 (\$101,080, 1914-15). The Peruvian Corporation owns about \$2,200,000 ordinary stock.

The Pacasmayo Ry. connects the port of that name with the towns of Guadalupe (twenty-six miles) and Chilte (sixty-five miles) and further extensions have been planned. Daily trains are operated to Guadalupe, beyond which the passenger service narrows down to only two or three trains a month. The Chilte extension will have to be built to a more inland point before it will pay. The company's pier at Pacasmayo is nearly one-half mile in length. The gross receipts of this railway for 1913-1914 were about \$108,000.

The Payta to Piura Ry. (sixty miles) runs from Payta, a seaport in the far north of Peru, noted for its lack of rainfall, to Piura, sixty miles inland (population, 10,000), the first town in Peru to be settled by the Spanish. The gross earnings of this railway for 1913-14 were about \$192,000.

The Chimbote Ry. (thirty-five miles) and Ilo-Moquequa Ry. (sixty-two miles), are also controlled by the Peruvian Corporation which likewise works under agreement the North Western Ry. of Peru running between Ancon Huacho and Sayan (130 miles).

The total income of the Peruvian Corporation for 1912-13 was £618,567 (£415,314 from railways and steamers), and the surplus after expenses, interest, sinking funds, etc., was £169,884, of which £167,704 was paid in dividends ($2\frac{3}{4}$ per cent.) on the 4 per cent. cumulative preference stock.* The capital and other assets of the Peruvian Corporation as of June 30, 1913, were valued on the company's books at £23,086,615 (£23,068,939, June 30, 1915). Stock and debentures outstanding totalled £21,676,000 (£21,543,850, June 30, 1915).

The principal railway not operated by the Peruvian Corporation is the Cerro de Pasco Ry. running from Oroya on the Central of Peru Ry. to the Cerro de Pasco mines and to the latter's coal fields (104 miles operated). The Cerro de Pasco mines (discovered in 1630)

*The income for 1914-15 was £406,715 and the Net Revenue was £163,838. $\frac{3}{4}$ % dividend was paid on the preference stock as of December 31, 1915; back dividends to the amount of approximately 80% remained due on this stock.



Photo by P. S. Penfield.

MOUNT MEIGGS, PERU, NEAR THE ENTRANCE OF THE GALERA
TUNNEL, PERUVIAN CENTRAL RY.



Courtesy of Pan-American Union.

PERUVIAN SOUTHERN RY. NEAR AREQUIPA.



Photo by P. S. Penfield.

SCENE ON LA GUAYRA-CARACAS RY., VENEZUELA.



Courtesy of Pan-American Union.

PORT OF CARTAGENA, COLOMBIA, TERMINUS OF COLOMBIA
RY. & NAVIGATION CO.'S LINE.

are now under American control; they had produced to the close of the nineteenth century fully 40,000,000 tons of silver and copper ore, their copper production being estimated at 50,000,000 pounds annually (48,600,926 in 1911). The railway is owned by the mining company; the highest altitude reached by it is about 14,300 feet.

Other railways, varying in length from ten to fifty miles, are in operation in the Republic, while an extensive network of lines is either now being built, surveyed, or is projected, including a railway (The Amazon-Pacific Ry.) from a point on the Cerro de Pasco Ry. to the port of Pucalpa on the Ucayali River, 280 miles, which will open up the rich department of Loreto and will afford an outlet for a vast wealth of rubber, timber, tropical products and extensive deposits of coal found in the regions traversed. This railway will be subsidized by the Government to the amount of \$9,733,000. A trans-Andine railway has been surveyed and the contract let to connect the Pacific port of Payta with points on the Marañon and Huallaga Rivers, tributaries of the Amazon. This railway (highest altitude, 6,600 feet) will cross the Andes at a far lower altitude than the Central of Peru Ry. and will present few really difficult engineering problems. The length will be about 435 miles and the cost \$6,000,000. The Santa Ana Ry. is under construction from Cuzco northward to Santa Ana. This line meets some heavy grades, including the ascent of El Arco.

Peruvian railway lines as a whole from year to year show steadily increasing profits. Their initial cost, however, was so great that many years will likely pass before any substantial return may be expected.

Peru has had its ups and downs, its hard knocks, yet it is slowly, surely coming into its own. Its civilization existed and flourished when our barbaric nomad ancestors were roaming the plains of Europe. Its inhabitants built walled cities of considerable size and beauty, cut out wonderful roads, irrigated great tracts for cultivation, and mined the gold, silver and copper. The later day Incas took up the struggle with nature and rounded out the works of their predecessors, only to fall before Pizarro and his handful of audacious Conquistadors from Spain. Since 1814 Peru as a Republic has wrestled with the problems of Government. Torn by revolutions in the early days, defeated in an unfortunate war with her stronger rival, Chile, and forced into deep financial troubles, the country has had a hard struggle. The rugged nature of the interior and the necessary difficulties of travel between its widely scattered communities has prevented the unification of the country. The extension of the railways is slowly remedying this condition and the opening of the Panama Canal will likely bring to Peru new settlers, capital and trade.

CHAPTER IV

ECUADOR.

THE RAILWAY TO QUITO AND ITS HISTORY—RAILWAY PLANS FOR THE FUTURE.

ECUADOR, in spite of being the smallest of the West Coast Republics south of Panama, has an area large enough to comprise all of New England and the States of New York and New Jersey. Within its 116,000 square miles are approximately 1,400,000 inhabitants, a large majority of whom are Indians or of mixed races. Although lying directly under the equator, probably no country on earth has greater varieties of climate. The low hot coastal lands, unlike the barren shores of Peru, are covered with dense tropical vegetation and are highly productive. Eastward of these steaming plains rises the vast cordillera of the Andes culminating in giant peaks no less than twenty-one of which are perpetually capped with snow. Many of the mountains are highly volcanic; some volcanoes are now active, others extinct.

Between the mountain ranges and peaks are cool pleasant valleys and plateaus, healthful to live in and capable of considerable cultivation. Eastward down the mountain slopes lies the Oriente, a vast tract of country covered with tropical forests and drained by numerous rivers carrying the melting snows of Coto-paxi and Chimborazo eastward to swell the waters of the mighty Amazon. Much of this great forest world

is practically unexplored. However, the Oriente, which covers fully one-half of Ecuador's area, is destined at some future day with the establishment of communication to add considerably to the potential wealth of the Republic.

Quito, the capital of Ecuador, lies in the heart of the Andean plateau, at an elevation of 9,375 feet. The city's foundation far outdates the Spanish conquest (1534) at which period it was one of the great centers of the Inca civilization. It is to-day the most important city of the Republic and has a population of about 85,000.

Guayaquil, the chief port, has an estimated population of over 70,000 and is located about sixty miles from the Pacific, on the River Guayaquil, near where this stream empties into the Gulf bearing the same name. It has been noted for years on account of its unhealthfulness, although this condition will be greatly improved by the sanitation of the port which is being carried out by the J. G. White Co., of New York and London. This engineering firm will drain the marshes and give to the city a comprehensive water supply. Although Guayaquil is the westernmost city of any importance in South America, it is almost due south of the Allegheny Mountains.

Ecuador has not progressed so rapidly as some of the other Latin American countries, having in the past often been torn with dissension and strife, or involved in financial difficulties. In consequence of these facts

and owing to the rugged nature of the country railway development has been slow. Owing to its location Ecuador should benefit largely by the opening of the Panama Canal, and railway building accordingly be greatly stimulated.

The Republic's exports for 1912 totalled \$13,717,900, as against imports to the value of \$10,652,800. About 27.6 per cent. of this trade was with the United States, 21.7 per cent. with Great Britain, 19.5 per cent. with France and 15.2 per cent. with Germany. Cocoa is the principal export, 15.5 per cent. of the world's production being supplied by Ecuador.

The only important railway in the Republic is the Guayaquil & Quito Ry. extending from Guayaquil to the capital. The railway which is owned by an American company is 288 miles in length. En route to Quito it climbs to an elevation of 11,841 feet and passes through Alausi (population 6,000), Riobamba (population 18,000), Ambato (population 10,000), etc. This enterprise was first started in 1872, at that time under different ownership than at present, and prior to 1876 the portion of the existing line between Yaguachi (about fourteen miles from Guayaquil) to Barraganetal (total about twenty-nine miles) was completed. During the eighties the road was continued on for a few miles, Sibamba being the goal sought, while Yaguachi was connected by rail with Duran (opposite Guayaquil). Finally, in 1908, the road was completed to Quito. The undertaking was a colossal one, rivalling Meiggs' fa-



MOUNT CHIMBORAZO, ECUADOR.
NEAR GUAYAQUIL & QUITO RY.



Photo by P. S. Penfield.

PORT OF PATILLOS, CHILE (NITRATE RYS.).

lish owned line equipped with American rolling stock, has recently been constructed connecting the port of Manta with Santa Ana thirty-five miles inland. There are also two or three small railroads in existence.

A French company has partly completed toward Quito a railway from the Pacific port of Bahia de Caraquez. This line will bring the rail distance from tide-water to the capital city to about 185 miles. It is said that were it not for a bar extending across its mouth, Caraquez Bay would be one of the best harbors in South America; as it is, only small ships can enter the port, steamers and large vessels being compelled to anchor outside. A channel will likely be dredged out before the railway is completed. The Equadorian Government's guarantee is behind the enterprise. 7,000,-000 franc 5% bonds are outstanding.

Among other railways projected is a line from Ambato, a station on the Guayaquil & Quito Ry., eastward down the Andean slope to San Antonio on the Cururay River. This river is a tributary of the Napo, one of the feeders of the mighty Amazon. The railway will extend through a wilderness now inhabited only by wild Indian tribes and will provide an outlet for the forest products of the Oriente.

Another railway in the making will connect the Guayaquil & Quito Ry. with Cuenca (population 30,000), the third largest city in the Republic, while a projected line from Guayaquil to the shores of the Pacific will pass through a large area of coal lands. When

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all of the railways at present either under construction or surveyed are completed, Ecuador's railway mileage will have been increased from about 400 miles at present in operation to about 1,200 miles.

CHAPTER V

COLOMBIA.

THE RAILWAY AND RIVER ROUTE TO BOGOTA—SMALL RAILWAY
MILEAGE IN REPUBLIC—GREAT FUTURE FOR THE COUNTRY.

ONE might write volumes about the splendid prospects and wonderful resources of the Republic of Colombia. Lying as it does less than 1,000 miles from the United States almost directly in the pathway of ships using the Panama Canal, and having an area as great as all of New England, and the Middle and South Atlantic States including West Virginia, the country presents great opportunities for development. Its mineral, agricultural and forest wealth is vast, yet its surface has to the present time scarcely been scratched. The population of Colombia is estimated at 5,472,604.

Colombia is an extremely mountainous country and railway building on an extensive scale has not been undertaken owing to the heavy cost involved. The existing railways are purely local lines, constructed to afford tidewater outlets for the products of various districts. Many years are likely to pass before any important trunk lines will be constructed as there is not at the present time sufficient traffic to make such undertakings profitable. It is likely however that a number of additional short lines will be built as soon as conditions improve, while several of the existing railways contemplate the construction of extensions.

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That railway building is in its infancy is shown by the following table, which indicates that there are at present less than 700 miles of railway in operation in this Republic:

Railways.	Mileage Operated.	Passengers.	Freight Tonnage.	Gross Earnings.
Antioquia.....	88	85,127	37,466	\$590,278
Amaga.....	8	709,758	10,400	97,971
Barranquilla.....	17	186,491	103,280	310,945
Colombia Ry. & Navigation Co....	65	36,794	46,253	215,407
Cucuta.....	44	58,914	22,802	517,209
Tachira.....	10	87,520	1,780	31,149
Cauca.....	*53	11,945	24,704	186,324
Dorada Extension.....	71	107,741	72,677	445,220
Colombian National.....	82	103,540	45,579	500,174
Colombian Northern.....	37	437,451	39,070	261,326
La Sabana.....	26	381,957	76,662	283,500
Southern.....	18	97,022	36,947	74,899
Santa Marta.....	92	180,252	135,698	509,716

Note.—The mileage given above is only approximately correct.

*About 100 miles completed to December 31, 1915.

The Antioquia R. R. was chartered February 17, 1874, to construct a railway to extend from Puerto Berrio on the Magdalena River, the Republic's principal highway of commerce, westward to Medellin, the capital of the State of Antioquia and the second largest city of Colombia. The railway is at last almost completed and its prospects are said to be unusually bright, as the country about Medellin is capable of developing considerable traffic. A large amount of German capital is invested in this company. The Government has granted to the builders of this line a cash subsidy and a land grant of considerable value.

The Barranquilla Ry. & Pier Co. operates a short line between Savanilla, an important port on the Caribbean Sea, and Barranquilla the port for the Magdalena River. As this river is not navigable at the mouth, the railway

handles a large proportion of the traffic intended for the interior. A valuable pier is owned at Barranquilla. The company is British owned. Earnings for 1914 (17 miles operated) \$35,678,876. This vast sum is however expressed in Colombian currency, which at approximately the current rate of exchange is equal to about \$350,000 U. S. gold.

The Colombia Ry. & Navigation Co.'s railway extends from the Caribbean port of Cartagena to Calamar on the Magdalena River. The company also operates a line of steamers on that river.

The traveler proceeding from the Caribbean Sea to Bogota, the capital, and to other interior points uses either of the above described railways to avoid the bar at the mouth of the Magdalena River; then to reach Dorada a river steamboat is used, the voyage consuming several days. At Dorada the passenger leaves the steamer owing to the presence of rapids in the river and uses the Dorada Extension Ry., owned by an English company, to Puerto Beltran. This little railway is seventy-one miles in length and returns a fair income on the \$3,452,500 capitalization. Its gross earnings for 1913 were \$514,000.

From Puerto Beltran a river voyage is again necessary to the port of Giradot, at which point the traveler en route to Bogota leaves the river and changes to the Colombian National Ry., which continues to Facatativia eighty-six miles away. This railway is controlled by a British Company which has had numerous financial

difficulties. The railway has proven itself extremely costly to maintain; grades are heavy and washouts frequent. The company has outstanding approximately \$11,900,000 stocks and debentures. Gross earnings for 1913 were approximately \$635,000. A portion of the debenture interest has been annually advanced by the Government; this remains due to the latter with interest compounded at 6 per cent.

The final stage of the journey from the Caribbean Sea to Bogota is via the Sabana Ry. which extends from Facatavia to the capital. Strange to relate this railway is of a different gauge than that of the Colombian National Ry. with which it connects. The gauge is however to be changed shortly. This railway is owned locally in Colombia.

The trip from the sea to the capital by the route discussed in the preceding paragraphs takes upwards of two weeks under ordinary conditions. The Pacific coast is much nearer Bogota, but the three interjacent ranges of the Andes would make the construction of a railway from the coast to the capital an extremely costly enterprise.

Among the other railway lines in operation in the Republic may be mentioned the following:

The Cauca, or the Pacific Ry., operates from the Pacific port of Buenaventura inland to Cali, about 103 miles from the ocean. The construction of this road, but recently completed, necessitated a large amount of tunneling, bridging, etc. The rich valley of the Cauca,

which is reached by the railway, contains large deposits of coal and other minerals. The importance of this line, in which Henry M. Keith and other Americans are interested has been greatly increased since the completion of the Panama Canal. The equipment in use is largely of American manufacture. It is expected that this line will eventually be carried southward to link with the railways of Ecuador, these lines to form a portion of the future Pan-American Railway—New York to Buenos Ayres.

The Santa Marta Ry., 99 miles in length, runs from the Caribbean port of Santa Marta to the town of Fundacion on the river of the same name. The line traverses rich banana lands and extensions are planned into territory capable of raising large quantities of fruit. Most of the company's £544,560 securities are held in Great Britain. Gross Earnings for the year ending September 30, 1914, were £154,581.

The other railways throughout Colombia serve local communities, mostly connecting interior towns either with the Magdalena River or with other navigable bodies of water. A number of short lines or extensions of existing railways are projected. The government is offering inducements to attract foreign capital to this Republic.

CHAPTER VI

VENEZUELA.

LACK OF RAILWAYS IN THE REPUBLIC—THE LA GUAYRA TO CARACAS ROUTE—THE GERMAN LINE.

VENEZUELA, like Colombia, is a land of wonderful opportunity, the country's resources having been developed scarcely at all. Its size is variously estimated at from 375,000 to 594,000 square miles and its population is about 2,800,000. The country greatly lacks railway facilities, there being at the close of 1912 only about 535 miles of line in operation. The gross revenues from the railways during the calendar year 1912 were \$2,506,020 and the operating expenses \$1,352,508. Since 1912 a few additional miles of line have been opened for traffic and there was, until the outbreak of the European War, a moderate increase in gross revenues in spite of the revolution in 1913, conducted by ex-President Castro in his attempt to overthrow the then existing government.

Probably the best known among the railways of Venezuela is the little twenty-two and three-quarter mile La Guaira & Caracas Ry., which is the property of an English company and which connects Caracas, the Republic's capital, with La Guayra, the principal Caribbean port. The road cost probably \$200,000 per mile to build, in spite of which a large profit has been earned and substantial dividends have been paid. The

company enjoys freedom from competition for 100 years and will retain the property in perpetuity. The company's gross earnings for 1913 (£106,500) were approximately \$23,000 per mile.

The scenery along this line is magnificent. The railway zigzags its way over narrow ledges overlooking deep chasms and the passenger enjoys many thrills while making the trip. To the casual observer it would seem that the trip is an exceedingly dangerous one. The trip however, is not dangerous; this is attested to by the fact that not a single life has ever been lost through accident.

The Great Ry. of Venezuela, operating 111 miles of road, is the largest of the railways operating in the Republic. The property is under German ownership and cost a considerable sum to construct. The line extends from Caracas through a rich and beautiful country to Valencia, the latter an important city of upwards of 40,000 inhabitants. Along the line there are no less than 212 bridges and eighty-six tunnels, grades being numerous and heavy. Gross earnings for 1912 were \$531,257 and the net earnings \$231,565, the latter amount representing but a small return on the cost of construction. Traffic is considerably lessened by the prohibitive freight and passenger rates charged. During former President Castro's administration this road was the cause of a serious disagreement between Venezuela and Germany, the latter despatching a fleet of war vessels to blockade Venezuelan ports. The dispute was

settled without bloodshed, but it did not improve the relations between the two nations.

Caracas is the terminus of another railway line which connects the capital with several important towns in the interior. This line, the Venezuela Central Ry., has under construction a road extending from its present terminus at Santa Teresa, located on the River Tuy, to Ocumare, capital of the State of Miranda. This railway has to date returned but little on the capital invested in it, but following the completion of the Ocumare extension earnings are likely to be considerably increased.

There are two other railway lines in Venezuela under British management, viz.: the Puerto Cabellos & Valencia Ry., and the Bolivar Ry. The former line connects the city of Valencia with Puerto Cabellos, which has probably the best harbor in Venezuela. One portion of this line over which the grade reaches 8 per cent. is built on the cogwheel principle. With the exception of this two and one-half mile stretch there were no engineering problems such as were met with in the construction of the La Guayra & Caracas Ry. Gross earnings for 1913 amounted to £43,750 and net earnings were sufficiently large to meet the interest on the £190,000 5 per cent. bonds and on the £170,000 income (5 per cent.) debenture stock.

The Bolivar Ry., which is the oldest line in operation throughout the Republic, extends from the port of Tucucas to Barquimeto, an interior city of consider-

able importance. A portion of the road extends through wild virgin forest country, which back a few miles from the railway is an unexplored wilderness. As the line nears Barquisimeto a valley capable of great agricultural development is traversed. The largest portion of the railway's traffic is however derived from shipments of copper from the mines at Aroa. These copper mines, owned by an English company, are the richest in Venezuela, returning annually to the shareholders enormous dividends. The railway is 110 miles in length and is building an extension twenty-eight and one-half miles in length into the San Felipe Valley. The company reported gross earnings in 1912-13 to the amount of \$519,041 and paid substantial interest and dividends on its \$6,130,000 stock and debentures.

Those railways of Venezuela which have not been dealt with in this chapter are short lines connecting various important towns and cities located in the interior with some Caribbean seaport or with Lake Maracaibo. The foreign trade of Venezuela for 1913, totalled \$47,513,892 (\$35,507,598, 1914).

CHAPTER VII

BRAZIL.

THE SAN PAULO RY. AND ITS GREAT EARNING CAPACITY—THE
BRAZIL RAILWAY AND ITS FAILURE—THE STORY OF THE
MADEIRA-MAMORE, THE MOST ISOLATED RAIL-
WAY IN THE WORLD—FUTURE OF BRAZIL.

BRAZIL ranks twelfth among the nations of the world in its total of railway mileage, Argentine being the only South American Republic surpassing it. The vast increase in the Republic's trade has stimulated the construction of railroads and continually through this means new sections of the country are being placed in communication with the outer world. The extent of the area of Brazil is little realized outside the Republic's own boundaries; its areas being equal to that of the United States (excluding Alaska), England, Ireland, Scotland, Wales, Holland, Belgium, Portugal and Switzerland combined. The population of Brazil is estimated at upwards of 23,000,000.

The Republic contains many large cities. Rio de Janeiro, the capital, is credited with 1,200,000 inhabitants and ranks fifth among the cities of the two Americas. Rio is located on one of the most beautiful harbors in the world, and around the city's waterfront a magnificent boulevard of white marble has been laid out. Palatial buildings abound, and there are numerous fine parks adorned with beautiful fountains and statuary, and luxuriant with tropical and semi-tropical vegetation. One

finds here museums, universities, a beautiful municipal theatre, also a fine system of tramway lines, etc. Once a pest-house of yellow fever, the city is today one of the cleanest and most sanitary in the world, the death rate being as low as 19 per thousand.

Sao Paulo, ranking among the cities of Brazil next to Rio in size and importance, has a population of nearly 500,000. The city stands at an altitude of about 2,000 feet and is the center of the Republic's great coffee industry. Within the limits of the city there are upwards of eighty miles of traction lines; also nearly 300 factories capitalized at approximately \$50,000,000 and employing 20,000 to 25,000 workers.

Bahia (population 300,000) is the third city of the Republic. It boasts of a splendid harbor. The city is practically being rebuilt, thousands of buildings having been razed to make room for larger and more modern structures. Streets and avenues have been widened, while millions are being spent on a new system of docks.

Para, the port of outlet for the Amazon River, is another large and important city, its population exceeding 200,000. The city is located almost directly on the equator and while of course hot is not unhealthful. Important harbor and dock improvements are being carried out by the Port of Para Co., controlled by the Farquhar-Pearson Syndicate.

Another great and growing city is Pernambuco (population over 200,000), while Manaos, Santos, Rio Grande do Sul and other places are making rapid strides forward.

The foreign trade of Brazil for 1913 amounted to \$639,653,589, a decrease of \$30,457,551 as compared with the total for 1912. Imports and exports for 1913 totalled \$326,025,511 and \$313,628,078, respectively. This excess of imports over exports was an unusual occurrence and reflected the business depression which Brazil has been undergoing for upwards of two years.

The existence of many rivers and a vast seaboard have greatly obviated the necessity for extensive railroad building. Brazil, not only has upwards of 4,000 miles of seacoast and the greatest river in the world, the Amazon, the basin of which covers about 3,350,000 square miles, but also has fully a dozen rivers averaging from 1,000 to 3,000 miles in length. Most of these rivers are tributaries of the Amazon; 10,000 miles of river are navigable for steamers and 20,000 miles additional navigable for flat boats and light draft vessels. The mighty Amazon, which is upwards of 3,300 miles in length, is navigable for steamers for 2,500 miles (to Iquitos, Peru). At the Peruvian-Brazilian boundary the river is two miles in width and as it flows eastward it widens until at its mouth it is 150 miles wide. The principal island in the delta of the river is more than twice the size of the State of Massachusetts.

Although coffee and rubber are the two principal products of Brazil, many other commodities are noted among the Republic's exports. Manufacturing also plays a part in Brazil's industrial progress; it is estimated that there are in the Republic upwards of 3,500

industrial establishments, representing an investment of nearly \$300,000,000 and employing nearly 200,000 hands.

Despite the large number of rivers within the bounds of the Republic, there were in operation in 1914-15 a total of 15,383 miles of railway, while about 8,100 miles additional were either under construction or approved. The Government operates a portion of the existing mileage.

The Government owned lines directly operated, although well equipped, are less successful than a majority of the privately operated railways in the Republic. The principal Government owned line is the Central of Brazil Ry., operating about 1,250 miles of road. This railway has its terminus at Rio de Janeiro, from which place it extends into the interior branching out in several directions and reaching a number of important cities including Sao Paulo, Bello Horizonte, capital of the State of Minas Geraes, etc. In spite of the density of its freight and passenger traffic the railway annually fails by a large margin to earn its operating expenses (operating loss for 1913, \$1,896,708). The Government expects to extend this system through the heart of the Republic to Para, on the Amazon River, 2,270 miles from Rio, a step which will do much to develop the northern and central portion of this vast country. The railway at present carries annually about 25,000,000 passengers and a large tonnage of freight consisting of coffee, iron ore, lumber, sugar, etc.

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The early history of the Central of Brazil is worth recording. The enterprise was projected in the year 1835, its promoters dreaming that it would be possible for them to carry the road from Rio de Janeiro north-eastward to Bahia, and southward to Rio Grande do Sul. To this day the programme mapped out 80 years ago has only partly been carried out, nevertheless the line is fast being rounded into a system of vast importance. Needless to state the dreamers who planned out the great enterprise never raised sufficient funds and soon allowed their concession to lapse. In 1838 and again in 1840 concessions—somewhat modified—were granted by the Government to build the road. Dr. Thomas Cochrane, who acquired the privilege in the latter year, managed to form a company and to raise a small amount of capital. Cochrane's company was never, however, in strong enough financial circumstances to carry out the enterprise and the concession only proved a stumbling block in the way of the construction of the railway. It was not until the year 1855 that Cochrane could be persuaded to give up his concession and in that year work on the enterprise commenced in earnest.

Construction work on the first section of the line (32 miles) was not difficult and on March 29, 1858, the first train, carrying the Emperor and other celebrities, was run amidst wild public rejoicing. Receipts for the first year were 302,279 milreis and Expenses amounted to 205,590 milreis. In 1859 the Receipts more than doubled



Courtesy of Pan-American Union.

THE TRAIL THROUGH THE FOREST.
(MADEIRA-MAMORE RY.)



Courtesy of Pan-American Union.

TRAIN ON MADEIRA-MAMORE RY., BRAZIL.



Courtesy of Pan-American Union.

RAILWAY STATION ON MADEIRA-MAMORE RY., BRAZIL.

the total for 1858, however, the Company's funds were meagre and the next stage of construction work necessary to carry the railway inland presented great engineering problems. A loan for approximately \$7,000,000 was floated abroad (through the Rothschilds), the loan being backed by the Government. These funds were sufficient to carry the line about 25 miles further inland to the mouth of the Tunnel Grande. To advance further into the interior this great tunnel, which is at an altitude of about 2,500 feet and which is 7,336 feet in length had to cut through the Serra. Work on this tunnel was commenced in 1858 and it was not finally completed until 1865. Once through the mountain progress was more rapid and each year an additional mileage of tracks was laid and each year earnings increased.

On October 13, 1914, there passed into hands of receivers the Brazil Ry., an Anglo-American enterprise incorporated in Maine, U. S. A., in 1906. This railway system, which consists of a number of consolidated lines extended and joined together into a unit, is the largest system operating in the Republic of Brazil and one of the largest enterprises of its kind in South America. The company was controlled by the so-called Farquhar-Pearson Syndicate, and until recently there was every indication that large profits would result from the undertaking; in fact, full dividends of 6 per cent. per annum were paid on the preferred stock during 1911, 1912 and 1913. However, the great European

war coming as it did in the midst of a business depression in Brazil, demoralized the railway's business and prevented the company from securing funds to finance its requirements, necessitating a receivership.

The Brazil Ry. as of June 30, 1914, operated directly 3,362 miles of main track, located mainly in the States of Sao Paulo, Parana, Sta. Catherina and Rio Grande do Sul. A large interest was also held in the Paulista Ry. (715 miles operated), running through the central portion of the State of Sao Paulo; the Mogyana Ry. (1,084 miles) operating in northern Sao Paulo and in Minas Garaes; also in the Madeira-Mamore Ry. (226 miles), described in a later paragraph. Subsidiary companies whose entire capital stocks are held by the Brazil Ry., have been engaged in the building of extensive ports, docks, warehouses, etc., at Rio de Janeiro, Rio Grande do Sul; also in lumbering, cattle raising, colonizing, etc. A total of about 560,000 acres of forest lands is owned or leased by the Brazil Ry., also about 6,000,000 acres of agricultural lands and a total of 8,163,081 acres of cattle grazing lands.

The gross earnings of the Brazil Ry. (for lines directly operated) for 1913 amounted to \$14,305,665. Gross earnings for a similar period of the Paulista and the Mogyana Railway totalled \$20,934,335. The total capitalization of the parent company as of December 31, 1912 (the latest statistics available), amounted to \$20,000,000 6 per cent. preferred stock, \$32,000,000 common stock and \$76,679,579 bonds. In addition secured notes were outstanding.

On the date of the appointment of the receivers for the Brazil Ry., announcement was made of the receivership of the Madeira-Mamore Ry., one-half of the stock of which was held by the Brazil Ry. and the balance by the Port of Para Co., the latter, like the Brazil Ry., a Farquhar-Pearson enterprise. This railway, whose history reads like a romance, suffered very heavily from the depression in the rubber trade and from the general stagnation of trade throughout the upper Amazon valley.

The Madeira-Mamore Ry., probably the most isolated railway in the world, is located far in the interior of South America and affords a means of routing traffic around a chain of dangerous rapids which prevent navigation through portions of the Madeira, Mamore and Beni rivers. The route followed by the railway was surveyed a number of years ago by Col. George Earl Church, an eminent American engineer and a party of followers, a large number of whom lost their lives owing to the climate; the heat and the swampy nature of the country traversed causing great hardships. Following Col. Church's survey numerous attempts were made to open this possible trade route. First a canal was authorized, but as this scheme did not seem to be feasible it was decided that a railway should be built. A company was launched in 1872, and a contract to build the line was let to the Public Works Construction Co. The latter company started work on the enterprise, but was shortly compelled to give it up. In 1877 the task was again attempted, this time by

P. T. Collins, of Philadelphia, who succeeded in completing nineteen miles of line and locating forty miles additional. The difficulties of the undertaking proved too great, however, and the work had to be abandoned. In 1903 the treaty of Petropolis, made between Brazil and Bolivia, imposed upon the former in exchange for territories granted by Bolivia, a guarantee that the railway should be constructed. Brazil subsequently let a contract to Joachim Catranby, who transferred it to the present owners of the line.

As previously stated the Madeira-Mamore Ry. was built to provide a means of transit around the series of rapids which exist in the Madeira, Mamore and Beni-rivers. The Madeira River system, the greatest tributary of the Amazon River, is nearly 3,000 miles in length and drains a basin estimated to contain 637,600 square miles. The river flows into the Amazon about seventy miles below Manaos, and were it not for the rapids which necessitated the construction of the railway here discussed it would be possible to journey via steamer from New York or any other Atlantic port far into the interior of Bolivia. At its junction with the Amazon, 850 miles from the Atlantic Ocean, the Madeira River is two miles in width and sixty-six feet in depth. A short distance below the rapids the river is a mile wide and about 100 feet deep. Near the town of Puerto Velho, about 480 miles from where the Madeira enters the Amazon, navigation ceases.

The Madeira-Mamore railway has its terminus at

Puerto Velho, from which point it extends southwestward and southward through the forest and jungle following the route of the river. The railway en route crosses a number of small streams; here and there along the route small villages and towns have sprung up. The railway passes opposite Villa Bella, Bolivia, near which town the Madeira River divides to become the Mamore and the Beni rivers. Each of these rivers have their source in the Bolivian Andes; the former in the State of La Paz and the latter in Cochabamba.

The Maderia-Mamore Ry.'s present southern terminus is at Guajara Miriam, on the Mamore River, beyond which point the river is navigable for some hundreds of miles. From Guajara Miriam the railway has been surveyed to Riberalta on the Beni River. This extension, which will be sixty-two miles in length, will pass around the various cataracts in the Beni River and will open a trade route of great importance to Bolivia. The Government of the latter Republic has authorized a railway from La Paz to some point on this river, which railway will provide an outlet for the trade of the Andean plateau on which most of the Bolivians have their homes.

Prior to the construction of the Madeira-Mamore Ry. the passage around the falls was an extremely difficult and dangerous task, and the cost of handling freight prohibitive. It is to be sincerely hoped that the owners of the railway will be able to overcome their financial difficulties and meet with the success which they so

justly deserve. Despite a considerable falling off in business during the second half of the year, gross earnings for 1913 reached the encouraging total of \$1,701,335, while net earnings amounted to \$812,335. The company had outstanding as of December 31, 1913, \$1,000,000 preferred and \$10,000,000 common stock. Approximately £2,600,000 60-year 6 per cent. bonds were likewise outstanding, a portion being guaranteed by the Brazil Ry. and a portion by the Port of Para Co.

Brief mention will be made here of four other important railways operating in Brazil; all of these are controlled by English companies:

The Leopoldina Ry., operating 1,700 miles of main track, extends from Nichtheroy, an important city located on Rio de Janeiro Bay, northward through the valley of the Paranahyba River, traversing the Provinces of Rio, Minas Geraes and Esperito Santo. Four rugged mountain ranges are crossed by the main line and many spectacular feats of engineering were performed by the builders. The maximum grade on the main line is about 8 per cent., while on the division which runs from Rio to Petropolis the grade reaches the maximum of over 15 per cent. The gross earnings of this railway system for the year 1913 amounted to \$9,351,855. The company had outstanding December 31, 1915, \$70,000,000 stock and debentures. Prior to the outbreak of the European war substantial dividends were paid by the company for a number of years.

The San Paulo Ry. is 134 miles in length, and its

main line produces more revenue per mile than any other railway in the Western Hemisphere. The line extends from Santos, via Sao Paulo, to Jundiahy, with branches to Bragantina, etc. The railway enjoys a monopoly of the traffic between Sao Paulo and Santos, and annually carries two-thirds of the world's supply of coffee. The company has outstanding approximately \$18,000,000 ordinary stock, on which dividends of 10 per cent. and upwards are paid annually, also \$5,000,000 preferred stock and \$10,000,000 debentures. The railway is one of the best maintained properties in the Americas. At Sao Paulo a magnificent passenger station has been erected, while excellent terminals are owned at Santos.

The San Paulo Ry. was constructed in the year 1867, and presented numerous difficult engineering problems. There are four different stretches of track which had to be laid on a 10% grade. Trains are hauled up and down these inclines by means of heavy wire ropes. In the year 1901 a duplication of the entire line from Santos to Sao Paulo (50 miles) was completed. This new line follows an entirely different route from the original line, its maximum grade being 8%. Wherever these heavy gradients are encountered the endless rope system is used. These rope cables—there are five of them in use—will support loads of 145 tons per train, and the trains are otherwise protected against accident by brake locomotives and other of the latest known safety appliances. The railway is constructed in a mag-

nificent manner and the scenery along the route is most beautiful.

The Great Western of Brazil Ry. operates about 1,010 miles of main track extending from Pernambuco into the interior and northward along the coast. The railway handles a considerable traffic in sugar, cotton, timber, etc., and is a successful enterprise. Gross earnings for 1913 were approximately \$3,750,000 and substantial dividends are annually being paid (6 per cent. in 1913 on common stock). The company's total capitalization is approximately \$19,000,000.

The Brazil North Eastern Ry. operates approximately 475 miles of road located in the State of Ceara. The railway has its tidewater terminus at Forteleza (or Ceara as it is sometimes called) to which port it brings cotton and cotton products in fair amounts; a large portion of its line is leased from the Government. Its importance is likely to be greatly enhanced upon the completion of a large additional mileage which is being constructed by the South American Construction Co. The State of Ceara is about the size of Illinois and its population is approximately 1,000,000.

Although suffering in common with many other countries from over-extension and from the effect of the great war now being waged in Europe, Brazil, owing to its vast area and unlimited resources, should have a very bright future, particularly in the great interior which is at the present time but sparsely settled. The Republic is at present in rail communication with Uru-

guay and Argentina, and in a few years trains will be running into Paraguay and Bolivia, through which latter Republic direct rail communications with the Pacific coast will be established.

CHAPTER VIII

THE GUIANAS.

THE OLDEST RAILWAY IN SOUTH AMERICA—HISTORY OF THE
DEMERARA RY.—PROBABLE RAILWAYS TO THE INTERIOR.

THE three Guianas—British, Dutch and French—are the only countries in South America which do not enjoy Republican forms of government. To the average American the term “Guiana” suggests something far away in Africa or Australasia, it being frequently confused with Guinea and New Guinea. The three Guianas—British, Dutch and French—have areas respectively of 90,277, 46,060 and 30,500 square miles and estimated populations of 300,000, 90,000 and 50,000.

British Guiana, the Eldorado of Sir Walter Raleigh, is the largest and by far the most important of the three colonies under discussion. The low lying lands on the country's Atlantic seaboard were in the days of slavery noted for their enormous production of sugar. To-day, though not so much as in the past, that commodity plays an important part in the development and commerce of the country, \$5,432,816 value of the product being exported in 1913. Cotton at one time was an important product of British Guiana; scarcity of labor has, however, caused the planting of it practically to cease. Gold, likewise, at one time was shipped from this colony in fair quantities; the production has, however, declined from 138,597 ounces in 1893-4 to 49,607 ounces in 1911-12 (the output was increased to 79,173 ounces in 1913). Balata (similar to gutta-percha) and other

products of the forests of Guiana are beginning to attract considerable attention, over 300 species of timber having been discovered. The foreign trade of British Guiana for the year 1913 amounted to \$18,297,653, and this total will likely be largely increased following the building of a proposed railway into the little known interior.

There are two railways operating in British Guiana at the present time. The more important of these is the Demerara Ry., 79 miles operated, the main line extending from Georgetown, the capital, westward to New Amsterdam, second city of the colony (60 miles); another line running from a point opposite Georgetown, on the Demerara River, eastward for about 19 miles. The railway's gross earnings for 1912-13 were \$237,505 and the surplus \$102,246. Dividends were paid on two classes of preference stock.

The main line of the Demerara Ry. is of a 4-ft. 8½-in. gauge, while the line between Vreed-en-Hoop on the west bank of the Demerara River and Greenwich Park on the Atlantic Coast (the West Coast Ry.) is of 3-ft. 6-in. gauge. The original prospectus of the Demerara Ry. was issued on September 3, 1845, when subscription was invited for 10,000 shares of £25 each, payable in installments. The proceeds of the stock sale were to be used to construct a line 20 miles in length from Georgetown eastwardly to Mahaica. The company was incorporated October 30, 1846, and the first grading was done in the summer of 1847. The enterprise had been floated during a great railway boom in

England and as this boom collapsed shortly after construction work had commenced, many of the shareholders who were interested in other railway properties found themselves unable to continue installment payments on the Demerara Ry. shares. The assistance of the Government of British Guiana saved the situation through advances made to the company; however only sufficient funds could be raised to construct five miles of road, Georgetown to Plaisance. This short line was opened for traffic in 1848 and is actually the oldest railway in South America.

Construction work on the line was recommenced prior to the year 1851; the line to Mahaica was not, however, finally completed until August 31, 1864. In 1899 the main line was extended to Rossignol, opposite New Amsterdam, which latter city is the second place of importance in the colony. The West Coast line referred to above was also completed in 1899. It is hoped that some day the main line will be extended to the boundary with Dutch Guiana.

Messrs. Sproston, Ltd., a firm operating coastwise and river steamers in the colony, have constructed a railway from Wismar on the Demerara River some 65 miles above its mouth to Rockstone, on the Essequibo River ($18\frac{3}{4}$ miles). The line is of metre gauge and was built to provide a means of access to the upper Essequibo River and to the Potaro goldfields. The lower Essequibo River (the largest river in the colony) is obstructed by a series of falls which make navigation below Rockstone impossible. The little railway runs

through a primeval forest and the timber traffic adds considerably to its revenue. This line was built in the years 1895 to 1897 largely through funds (\$200,000) loaned by the Government to the company and repayable over a series of twenty years without interest.

Dutch Guiana, or Surinam, as it is sometimes called, is about the size of the State of New York. Commercially it is only of small importance, its annual trade abroad not exceeding \$8,000,000. Balata and sugar are the principal exports, although gold is sent abroad in moderate quantities. There are about 109 miles of railway in the colony, practically all of which are operated by the Government. The Surinam Ry., which is the only line in Dutch Guiana, extends from Paramaribo inland to Dam, a gold shipping point located in the territory of Lawa. Gross earnings of the line for 1911 amounted to about \$54,000.*

French Guiana, or Cayenne, as it is generally called (a name suggesting cayenne pepper, although none of this product grows in the colony), is the least important among the countries of South America. The colony is a French penal settlement and may be remembered as the prison of Captain Dreyfus, whose case attracted so much attention a few years ago. The colony has a bad name and has not attracted settlers; therefore it remains mostly in its primeval state. No railways have been built and very little capital has been invested to develop the country's resources. Cayenne's foreign trade for 1913 was about \$5,000,000.

*Only one through passenger train per week is operated in each direction. The road traverses a poor country and does not nearly earn operating expenses.

CHAPTER IX

URUGUAY.

WEALTH AND PROGRESS OF THE REPUBLIC—ENGLAND'S RAILWAY INVESTMENTS—THE CENTRAL OF URUGUAY RY.

URUGUAY is a progressive country. Although its area is but 72,000 square miles (about ten times the size of New Jersey), the republic enjoys a foreign trade larger than that of Peru, Ecuador and Paraguay combined, the only countries in South America with larger commerce being Argentina, Brazil and Chili. The exports and imports of this, the smallest of the South American republics, amounted in 1912 to \$55,000,000 and \$47,000,000 respectively. Included among the exports was wool to the value of \$26,781,539.

It was estimated as of December 31, 1913, that the population of Uruguay totalled 1,279,359. Immigration during 1913 exceeded emigration by 28,504 and the growth of the little republic has been continuous. Over one-fourth of Uruguay's inhabitants live in Montevideo, the capital, one of the most progressive and beautiful cities in the continent.

Montevideo (population 366,195) is the fourth largest city in South America, being outranked in size only by Buenos Ayres, Rio De Janeiro and Sao Paulo. It is located on a point of land jutting out into the Rio de la Plata and is but 108 miles journey from Buenos Ayres via steamer. The city is beautifully laid out with wide boulevards, fine parks and plazas and contains many palatial residences and handsome public buildings,

cathedrals, etc. Two electric street railways, one British and one German, serve the city, the British controlled line carrying upwards of 40,000,000 passengers annually.

The ports of Uruguay in 1912 harbored 5,562 vessels of a total of 10,593,958 tons. Montevideo, the only important port of entry, has a fair harbor, which is being continually bettered. Vessels of fair size may come up directly to the quays. The warehouse accommodation is very good, numerous electric cranes have been erected, and a belt line of railway tracks connect the docks with the various railways which have their terminals in the city. Three thousand two hundred and forty vessels of 6,387,343 tons entered the harbor of Montevideo during the first six months of 1913.

Uruguay is primarily a pastoral country. During 1912, \$45,534,297 value of live stock products (including wool valued at \$26,781,539 as stated above) were shipped abroad. A census taken during 1908 showed that there were within the republic a total of 26,286,296 sheep, 8,192,602 cattle, 556,307 horses and 180,099 hogs. The widely known Liebig Co's meat products plant is located at Fray Bentos on the Uruguay River and uses large quantities of Uruguayan beef.

There are approximately 1,600 miles of railway lines in Uruguay. Nearly all of the operating companies receive government guarantees, these guarantees averaging annually over a ten-year period (1905 to 1914) from £130,466 to £206,725. The relatively flat nature of the country makes railway building less expensive than in

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other South American countries. The following table refers to the principal railways in operation throughout the Republic (all of four feet eight and one-half inch gauge):

	Miles Operated.	Gross Receipts.	Net Receipts.
Central Uruguay Ry. (1913-14).....	977½	*\$5,516,145	*\$2,402,510
Midland Uruguay Ry. (1912-13).....	291	682,112	194,948
Northwestern of Uruguay Ry. (1911-12)	113	248,585	124,410
Uruguay East Coast Ry. (1911-12)....	78	176,607	33,164
Uruguay Northern Ry. (1912-13).....	71	†150,985	54,835

*As compared with \$6,216,965 Gross and \$2,871,925 Net, 1912-13.

†Gross receipts for 1913-14 were \$133,185 and for 1914-15 were \$94,775.

CENTRAL URUGUAY RY.

Principal among the railways operating in the Republic is the "Central Uruguay Ry. of Montevideo" or the "Central" as it is commonly called.

The system is operated in four sections as follows:

	Miles.
Central Uruguay Ry. (including Northeastern Line).....	271
Central Uruguay Northern Extension Ry.....	184½
Central Uruguay Eastern Extension Ry.....	311
Central Uruguay Western Extension Ry.....	211

The main line, which earned during 1912-13, \$13,629 per mile, traverses the central portion of the country from Montevideo to Santa Izabel, a short distance beyond the Negro River. The first fifty miles of country traversed is extensively cultivated for wheat, garden products, grapes, etc. En route to Santa Izabel the line passes through the most populous portion of the Republic. Along the route are several cities such as Pando, Santa Lucia, Florida, etc., with populations varying from 8,000 to 12,000. From Santa Lucia a



Courtesy of Pan-American Union.

STATION AT SAO PAULO (SAN PAULO RY.), BRAZIL.



Photo from Pan-American Union.

SCENE ON THE BRAZIL RY.

UNIV.
O.



Courtesy of Pan-American Union.

BRIDGE ON CENTRAL OF URUGUAY RY.



Courtesy of Pan-American Union.

TRAIN ON PARAGUAY CENTRAL RY.

short branch extends to San Jose, a city of nearly 15,000 inhabitants. This branch crosses the Santa Lucia River over the longest bridge in Uruguay. The North-eastern line, the earnings of which are included in the income statement of the main line, extends from Montevideo to Minas (population 15,000), capital of the State of Minas.

The Northern, Eastern and Western Extensions are worked by the Central Uruguay Ry. proper on a percentage basis.

NORTHERN EXTENSION.

(Central Uruguay Ry.)

The Northern Extension earned in 1912-13, \$4,043 per mile. It is a continuation of the main line northward from Santa Izabel to the Brazilian frontier, which is reached at Rivera, 182 miles from Santa Izabel. The country traversed is much more thinly settled than the territory served by the main line. Cardosa, a German settlement and Tacuaremba, a town of 10,000 inhabitants, are stations of some importance. Directly across the frontier from Rivera is the Brazilian town of Sant' Anna do Livramento, whose several large jerked-beef factories furnish a considerable part of the line's traffic. A link line of three rails (opened September, 1914) connects the terminus of the Northern Extension with that of a section of the Brazil Ry. (1-meter gauge), and is expected to stimulate increased traffic especially that in timber from the forests of Southern Brazil. At present, however, products of animals form the bulk of the freight traffic.

THE EASTERN EXTENSION.

(Central Uruguay Ry.)

The Central Uruguay Eastern Extension Ry. earned in 1912-13, \$4,047 per mile. The line starts from a point on the Northeastern line, twenty miles out of Montevideo, and runs north and east to Melo, with a branch to Treinta-y-Tres, capital of the State of the same name.

Most of the country served by this extension is well wooded and watered, and large tracts of it are suitable for agriculture, which is a rapidly growing industry; though pastoral products still form the chief source of traffic. Melo, the capital of the State of Cerro Largo, has a population of some 13,000 inhabitants.

THE WESTERN EXTENSION.

(Central Uruguay Ry.)

From San Jose the Western Extension traverses principally an agricultural country. There is a branch from Mal Abrigo to Colonia. From Bizchoa it descends through pastoral country into Mercedes, a city of some 17,000 inhabitants on the Negro River. Mercedes has a large jerked-beef factory. Timber, stone and charcoal are other traffic commodities.

The "Central" during 1912-13 handled 1,657,986 passengers, 1,127,192 tons of freight and 1,346,396 head of live stock. A daily limited express train is operated between Montevideo and Rivera on the Brazilian frontier (350 miles).

The terminals and passenger station at Montevideo owned by the "Central" are well located and are of great value. Large quantities of cattle and other pastoral products, and a fair tonnage of cereals for export and for the markets of Montevideo are brought from the interior, which in turn takes the manufactured articles, building material, etc., imported from the United States and Europe. The railway has played an important part in the development of Uruguay.

Dividends of $6\frac{1}{2}$ per cent. were paid on the ordinary stock during 1913. In 1914, owing to the severe depression in Uruguay and the consequent decline in earnings the dividend was reduced to $2\frac{1}{2}$ per cent.

MIDLAND URUGUAY RY.

The Midland Uruguay Ry. has its terminus at Paso de los Toros (on the Central Uruguay), from which point it runs northward and westward. The railway passes through Algorta, Paysandu (second city in commercial importance in Uruguay) and other fair sized towns and has its northern terminus at Salto. Paysandu and Salto have each over 20,000 inhabitants. From Algorta a branch extends to Fray Bentos (eighty-seven miles). This company has outstanding approximately \$11,961,000 stock and debentures. Earnings have never come quite up to expectations and the interest on debentures has been paid annually largely through the medium of Government subsidies.

NORTHWESTERN OF URUGUAY RY.

This railway was incorporated in 1882 and extends from Salto, the head of navigation for the Uruguay River, westward and northward to Quarahim on the Brazilian frontier. From Quarahim a bridge has been constructed to connect with the Brazilian Great Southern Ry. This international bridge, recently completed, is owned jointly by the two railways. The Brazilian line, although of a different gauge than the Northwestern of Uruguay, should provide the latter with a certain amount of through traffic and should reduce operating costs as international traffic has hitherto been handled by means of expensive ferries.

The country served by the Northwestern of Uruguay Ry. is largely agricultural and pastoral. The railway carries large quantities of sheep, enroute to the Montevideo refrigerating plants, and cattle destined for the Liebig plant at Fray Bentos. At Zania Honda the company has successfully established an extensive agricultural colony.

The railway is operated under a Government guarantee. A total of \$7,252,590 stock and bonds is outstanding. Dividends of from 2 per cent. to 3 per cent. have, for some years past, annually been paid on the first preferred stock (6 per cent. non-cumulative).

URUGUAY EAST COAST RY.

This company has outstanding approximately \$3,128,000 stock and debentures. Receipts, though insufficient

to render the line profitable, are on the increase and the outlook for the future is promising. The company receives a guarantee from the Government, which has the right to purchase the line under certain conditions.

This line, seventy-eight miles in length, starts from Olmos, a point on the Central Uruguay (Northeastern) Ry., and has its terminus at Maldonado, a coastal town in the department of the same name. Much of its traffic is due to the fact that Punta del Este and Piriapolis, close to Maldonado, are seaside resorts for the people of Montevideo and Buenos Ayres, but the railway also serves a good pastoral and agricultural country. In addition to the products of the farms and ranches a large quantity of fish is handled. The railway has projected an extension from San Carlos on the main line northward to Rocha.

URUGUAY NORTHERN RY.

This line extends from Isla de Cabellos (on the Northwestern Ry. of Uruguay) to San Eugenio, on the frontier with Brazil. The latter town (population 1,200) is a receiving station for large quantities of cattle, there being a number of meat products factories in or near the town. This company receives a guarantee from the Government. The capitalization consists of £100,000 ordinary stock, £250,000 preferred stock (7 per cent. cumulative) and £498,402 debenture stock.

No dividends are being paid on the ordinary stock. Two per cent. was paid on the preferred stock in

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1912-13 as against $1\frac{3}{4}$ per cent. paid in 1911-12. The preferred stock is entitled to cumulative dividends up to 7 per cent. per annum. To June 30, 1913, \$1,702,115 (£340,423) dividends were in arrears; these dividends being payable out of future profits (if earned).

URUGUAY RY.

An important new railway system has recently been incorporated under the name of the Uruguay Ry. controlled by the Brazil Ry., which is to build a line from San Luis on the Brazilian border to Colonia, situated only twenty-six miles from Buenos Ayres. At Colonia, if plans materialize, docks, etc., will be constructed and arrangements will be made so that large ocean steamers will be able to load and unload. Following the failure of the Farquhar-Pearson enterprises this railway was purchased by the Government. It is likely that the completion of this railway will be delayed and that construction plans will be somewhat modified.

CHAPTER X

PARAGUAY.

THE PARAGUAY CENTRAL RY.—FUTURE LINES TO OPEN UP INTERIOR—FUTURE OF PARAGUAY.

THE only railway in the Republic of Paraguay is the Paraguay Central Ry., controlled by an English company.

This railway extends from Asuncion, the capital of Paraguay, via Paraguari, Villa Rica and Borja to Villa Encarnacion on the Parana River (232 miles). A car ferry was placed in service in October, 1913, between the latter point and Posadas, Argentine, the terminus of the Argentine Northeastern Ry. The gauge of the Paraguay Cenral Ry. has been changed to a gauge similar to that of the Argentine Northeastern Ry. and together with the latter and the Entre Rios Rys. forms part of an important Trunk System instead of a purely local line isolated from all other rail connections. Through the completion of this all rail line the time consumed in making the trip from Asuncion to Buenos Ayres has been reduced from five days to fifty-four hours. Through passenger service was established October 12, 1913. In 1914, following the outbreak of the European war, receivers were appointed for this company.

The gross receipts of the Paraguay Central Ry. for 1912-13 amounted to \$732,557. Interest was earned and paid on \$3,000,000 6 per cent. debenture stock and \$2,500,000 6 per cent. notes. There is also outstanding

\$6,500,000 5 per cent. income debenture stock (on which no interest was paid in 1913) and \$2,814,650 ordinary stock.

This company is building an extension to the Brazilian frontier, where it will connect with the Brazil Ry.'s system. This will mean much to the inland Republic, as it will open an easy route for immigration, so necessary for the development of the vast resources of the country, which has an area of 196,000 square miles (larger than New England and the Middle Atlantic States combined) and a population of only 800,000. Surveys have been made for the construction of a trans-continental railway system, to include the new section of the Paraguay Central Ry., which, if plans materialize, will extend from the port of Sao Francisca, westward through the State of Parana, Brazil, to the Falls of Iquazu (which rival Niagara), where the Republics of Brazil, Argentine and Paraguay join, thence across Paraguay to Asuncion (via Paraguay Central lines completed or building), and up through the Chaco Country to Bolivia where it either will connect with a line (presumably the Antofagasta & Bolivia Ry.) or else will be extended to Chili and the Pacific Coast. The construction of this system, which will likely take a number of years to complete, will open up vast unexplored territory in Paraguay and Bolivia and will do much to develop the country traversed. A large amount of traffic is assured, as vast tracts of forests, agricultural and grazing lands will be opened to settlement and cultivation.

The total foreign commerce of Paraguay for the year 1913 was \$13,338,398 (\$9,441,807, 1914).

Paraguay is truly a land of the future and its inhabitants are awakening to the prospects of their home land. Large ranches are being stocked with cattle, timber tracts are being developed and other steps being taken to develop the country.

CHAPTER XI PANAMA.

THE STORY OF THE PANAMA RY.—ITS ENORMOUS PROFITS—
DE LESSEPS AND THE RAILWAY—TRAGEDY OF THE FRENCH
CANAL, ENTERPRISE—PRESENT STATUS OF THE
RAILWAY—THE REPUBLIC OF PANAMA.

NO citizen of the United States can read the story of the accomplishments of its engineers in various portions of the great continent to the south of us without feeling a thrill of pride. Thanks to the enterprise, skill and daring shown by the Yankee, the almost inaccessible plateaus at the top of the Andean Cordillera, with their treasures of silver, gold, copper, tin, etc., were placed in rail communication with the outside world. The exploits of Henry Meiggs and his successor, William Thorndyke, the builders of the Oroya Ry. in Peru, and those of Col. George Earl Church, William Wheelwright and others stand foremost in the annals of the world's great engineering feats; yet their feats of skill and daring hardly surpass those of Messrs. Stephens, Totten, Trautwine, Baldwin and Williams, the builders of the Panama R. R.

The scheme of building a railroad across the Isthmus of Panama originated at as early a date as 1828, the same year in which the first two railways in the United States were opened for traffic, viz.:—the Baltimore & Ohio and the Carbondale & Honesdale (Delaware & Hud-

son Co.). During that year the Government of New Grenada (afterwards the Republic of Colombia) engaged J. A. Lloyd, an engineer, to survey a possible railway route from near the head of navigation on the Chagres River to Panama City or to some equally accessible point on the Pacific Ocean, and likewise a short canal from the Carribean Sea to a point on the Chagres River some distance above the mouth.

Sufficient funds to carry out this undertaking could not be raised by the Government of New Grenada, and it was unable to interest the outside world in the proposition. The matter was apparently practically dropped until 1835, during which year Henry Clay and one or two associates advocated in Congress the construction of a line across the Isthmus to be owned and operated by the Government of the United States. Twelve or thirteen years were destined to elapse, however, before there were any real developments leading to the construction of this much talked of railroad, and twenty years were to pass ere any trains were to be operated from ocean to ocean.

In June, 1847, the Republic of New Grenada granted a charter to build the railway to Mateo Klein, representing a French Corporation known as the Panama Co. The railway was to be completed within six years and freedom from competition was guaranteed for 99 years. This concession was allowed to lapse in June,

1848, on account of the Company's insufficient funds.

In February, 1848, gold was discovered. This announcement had scarcely been made to this new land of wealth commenced. of the trip across the continent were so trip around stormy Cape Horn so long and many of the gold seekers found it advisable to utilize the Panama route in spite of its dangers for fevers, etc. This made it possible for American Americans, John L. Stephens, William Pinwall and Henry Chauncey, who had obtained a concession from the New Grenadian Government after the collapse of the French undertaking, to initiate the undertaking. Accordingly on April 15, 1848, the Panama R. R. was incorporated with a capital of \$1,000,000 (shortly afterwards increased to \$2,000,000).

The new company at once sent engineers to explore the route. These engineers pronounced the route practicable. A contract to build the road was let to Col. Geo. M. Totten and John C. Trautwine. These two gentlemen soon found, however, that the company had greatly underestimated the probable cost of the work, and upon request were released by the company from their agreement, although the company, to construct the road under its own supervision, retained them as advisory engineers.



Few feats of modern times rival this undertaking. *Stephens, Trautwine and Totten, assisted by Captain John J. Williams and Jas. L. Baldwin were the directors of the working force, and to their unflinching courage is due the ultimate success of the undertaking. Hardships were innumerable, and the myriads of insects which swarmed through the swamps and jungles traversed made life almost unbearable. Mr. Trautwine, in a letter to the American Railroad Journal dated January 6, 1851, gave a graphic description of then existing conditions:

†“At this time (May and June, 1850) no accommodation was procurable for ourselves and our workmen, except a small brig. Our laboring force was consequently very limited, and the rainy season having fully set in, converted the earth into a perfect swamp, and moreover prevented the burning of the dense forest which we were attempting to clear. The mosquitoes and the sand flies were at the same time so numerous

*John Lloyd Stephens died October 10, 1852, from the effects of illness contracted at Panama. He was 47 years of age at the time of his death and had already made himself famous through his books on Central America, Yucatan, etc., which even to the present day are considered as standard works on the subject.

Captain John Jay Williams was born in the year 1818. While in the employ of the company he rendered very valuable services. His death occurred about 15 years ago at Jackson, Tenn.

James L. Baldwin, who was perhaps the most active among the engineers in carrying the line through the swamps, ended his career in a most tragic manner. Fever and tropical diseases apparently affected Baldwin's mentality and he was said to have dissipated heavily. In 1868, while acting as assistant engineer of the railroad, he shot and killed William Parker, the superintendent, and then attempted suicide. His death is said to have occurred in the hospital several weeks after the murder of Parker, although it has often been rumored that he escaped by steamer and disappeared.

†See “The Panama Gateway,” by Joseph Bucklin Bishop, Secretary of the Isthmian Canal Commission (N. Y., 1913).

that it was with difficulty we could induce the laborers to continue their work—and that only by remaining with them in person and aiding them during the whole day. These discomforts, together with the stifling heat and myriads of insects in the cabin and hold of our small brig, prevented other sleep than that arising from exhaustion and frequently compelled us to pass whole nights on deck in the rain, rather than encounter the annoyances below.”

As a natural consequence of working under these conditions, labor was most difficult to procure, and the death rate among employees extremely high. Stephens was sent home to die and other of the leaders returned to the United States broken in health. No record was kept of the number of deaths; estimates placing the total anywhere from 835 to 6,000. Luckily the builders of the road, unlike those who served under D'Lesseps in his attempt to build the canal, did not have to contend with much yellow fever, so that the percentage of recoveries among cases of illness was fairly high. Inasmuch as the number of men employed was never very large, it may be assumed that the minimum estimate of deaths is more nearly correct. The oft-told tale that each tie represents the price of a human life is of course an absurdity; there being no less than 150,000 ties in the main track, or from 15 to 20 times as many ties as there were employees.*

*Tracy Robinson, who spent upwards of 40 years at Panama, estimates the death rate at 40% of the working force, which totalled during the entire construction period about 6,000 men. His estimate (2,400 deaths) seems a very reasonable one.

The story is told by Dr. F. N. Otis, in his "Handbook of the Panama R. R." (written 1861), of the misadventures of 1,000 Chinamen who were employed as laborers on the railroad. "They had been engaged upon the work scarcely a month," wrote Dr. Otis, "before almost the entire body became infected with a melancholic suicidal tendency, and scores of them ended their unhappy existence by their own hands. Disease broke out among them and raged so fiercely that in a few weeks scarcely 200 remained."

"The railroad was finished (early in 1855). It had cost \$7,000,000. Would it pay?

"To one who had never seen a tropical jungle it might seem strange that a little road, less than fifty miles in length, should have cost very nearly \$140,000 per mile; more especially when there had been no heavy grading, no tunneling, no rock cutting of any importance; and a summit level of only 262 feet above the sea. Without the least suspicion of extravagance or dishonesty, how could the total expense have been so enormous?

"But the real wonder was that the road had been built at all. To this distant day, one cannot pass from ocean to ocean and see from the car windows the dense masses of tangled verdure on either side, forming in many places green walls apparently impenetrable, without a sense of the marvelous. How could lines ever have been run? And afterwards, how could men have been found to penetrate and conquer this torrid wilderness?" (Panama, 1861-1907, by Tracy Robinson.)

As stated, in 1855 the last spike on the line was driven and the first locomotive sent across the Isthmus. Immediately a rush of traffic commenced and the management, owing to the scarcity of equipment, found itself utterly unable to cope with the situation. Accordingly a "joke" rate schedule was gotten up for the occasion in the hope of temporarily checking the traffic. The first-class passenger rate was fixed at \$25.00 single fare, or over 50 cents a mile, while the second-class (native) rate was \$10.00. Exorbitant baggage and freight rates were likewise charged, the rate on coal being \$5.00 a ton. This "joke" tariff did not have the desired effect and did not in any way reduce the amount of business. Finding itself able to collect these rates the company maintained them with but little change until the sale of the road to D'Lesseps in 1881.

In the year 1868 the magnificent sum total of \$4,337,668 was earned by the railroad. The profit for the year after all Fixed Charges was \$2,307,483, equal to nearly 33 per cent. earned on the \$7,000,000 stock (the stock had been increased from \$5,000,000 to \$7,000,000 in 1865 by the payment of a 40 per cent stock dividend). The company was not destined to increase its earnings, however, for many a year to come, and a number of severe trials were in store for it. In 1869 the last spike was driven in the first transcontinental railroad across the United States, and practically all traffic to and from the far west was diverted to this new route. The Panama R. R. even then would have been an extremely profitable

line had not a disagreement occurred between its directors and the rich and growing Pacific Steam Navigation Co. The misunderstanding was over a division of rates, and all evidence seems to point to the fact that the Railroad Company was wholly to blame. Failing to come an agreement, and disgusted at the high-handed manner in which the Panama R. R. treated all propositions leading to a settlement, the Pacific Mail Steamship Co. practically abandoned the Isthmus route and sent their fleet to and from the west coast of South America via the Straits of Magellan or Cape Horn.

Immediately the earnings of the Railroad began to fall off, the total for 1871 amounting to but \$1,284,419. This led to the passing of the dividend, although payments were again resumed during 1872. In the latter year, Alden B. Stockwell, a Wall Street operator quite famous at that period, once a steward on a Hudson River steamboat, taking advantage of the decline in the value of the company's stock, acquired control and assumed the presidency. He was succeeded in 1874 by Russell Sage, who resigned a year later in favor of Trevor W. Park, the latter retaining the office until the French Canal Co. acquired the property in 1881.

During the years 1872 to 1881 comparatively large dividends (usually 10 per cent. to 16 per cent.), were paid by the company, in spite of which fact the stock did not sell at a very high figure (in the earlier days it on one occasion sold at 300). The company's concession from the Government of Columbia lapsed during this

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period and although the concession was renewed the terms were much less favorable than theretofore. Likewise the road and rolling stock were allowed to run down considerably.

Early in the eighties a new light appeared on the horizon. Ferdinand D'Lesseps fresh from his Suez Canal triumph had turned his eyes westward to Panama and had formed the *Compagnie Universelle du Canal Interocéanique* to canalize the Isthmus. The French company soon found itself unable to accomplish anything without acquiring control of the railroad. At that time (1881) the stock of the Panama R. R. was quoted on the New York Stock Exchange at about \$100 a share, yet D'Lesseps agreed to pay \$250 a share for the same. Thus in 1881 a total of 68,534 shares of the stock were turned over to the French company for the sum of \$17,133,500. The American stockholders were likewise permitted to pay to themselves a dividend of $34\frac{1}{4}$ per cent for the year and to retain certain treasury funds.

During the French regime in Panama the earnings of the Railroad naturally increased considerably, owing to the increased population of the Isthmus. Passenger and freight rates were reduced considerably. In spite of the increased revenues, operating expenses went up even at a greater rate, therefore profits were usually less than during the period of American ownership.

The story of the attempt of the French company to build the Canal, although not directly a part of this narrative, is a most interesting one. Extravagance and

mis-management doomed the undertaking to failure from the start. Working as they did, under the most distressing circumstances, one cannot but admire the wonderful pluck and heroism shown by the engineers and others who were in charge of the undertaking and stuck to their posts. No less than 16,500 workers were said to have died ere the enterprise collapsed, mostly from the effects of the dread scourge, yellow fever.

During the French occupancy the Isthmus became the dumping ground for embezzlers, bank robbers and escaped criminals of every description. The only industry on the Isthmus that prospered was the saloon and that did a 24-hour-a-day business. James Anthony Froude, the English historian, writing in 1887 ("The English in the West Indies") gives a vivid description of conditions:

"In all the world there is not perhaps now concentrated in any single spot so much swindling and villany, so much foul disease, such a hideous dung-heap of moral and physical abomination, as is the scene of this far-famed undertaking of 19th century engineering. By the scheme, as it was first propounded, six-and-twenty millions of English money were to unite the Atlantic and Pacific Oceans, to form a highway for the commerce of the globe, and enrich with untold wealth the happy owners of the original shares. The thrifty French peasants were tempted by the golden bait, and poured their savings, into M. D'Lesseps' lottery box. Almost all that money, I was told, has been already spent, and only a

fifth of the work is done. Meanwhile the human vultures have gathered in the spoil. Speculators, adventurers, card sharps, hell keepers and doubtful ladies have carried their charms to this delightful market. The scene of operations is a tropical jungle, intensely hot, swarming with mosquitoes, snakes, alligators, scorpions, and centipedes; the home, even as nature made it, of yellow fever, typhus and dysentery, and now made immeasurably more deadly by the multitudes of people who crowd thither. Half buried in mud lie about the wrecks of costly machinery, consuming by rust, sent out under lavish orders, and found unfit for the work for which they were intended. Unburied altogether lie also skeletons of the human machines which have broken down there, picked clean by the vultures. Everything which imagination can conceive that is ghastly and loathsome seems to be gathered into that locality just now——."

What a pity it is that Froude could not have lived to have seen the Panama of the present day!

On May 15th, 1889, D'Lesseps abandoned work on the Canal. The railroad for the time being was run by the Receivers of the French Company. Its earnings naturally greatly decreased, being only \$1,376,286 in 1894, as compared with \$3,404,808 earned during the year 1888. Only 44,805 passengers were carried during 1894, as against 959,535 carried during 1887.

Of the history of the Panama R. R. from 1894 to 1904, in which latter year the property was acquired by

the United States Government, there is little to relate. Late in 1894, another French company made an attempt to construct the Canal, and likewise took over the operations of the Railroad. The latter paid its owners an occasional dividend, usually at a low rate.

In April, 1904, a few months after the establishment of the Republic of Panama, the United States Government appropriated the sum of \$50,000,000 to acquire the properties of the French Company and to acquire privileges from the new Republic. \$40,000,000 of this sum was paid to the French Company, of which sum \$6,800,000 represented the value of the railroad. The amount of profits earned by the railroad since its acquisition by the United States have been over \$14,000,000, while Maintenance Expenses have been very heavily charged. In 1911-12, Gross earnings, not including income from the operation of steamships, were \$4,677,366, or \$93,549 per mile (the Pennsylvania R. R. earned \$43,381 per mile during 1912); in 1912-13 and in 1913-14 Gross Earnings were \$4,599,163 and \$4,567,406 respectively. In 1914-15, following the opening of the Canal, Earnings decreased to \$2,787,057. The line is double tracked throughout and in the best possible physical condition. It is generally conceded that the Company's rate sheet would not stand the scrutiny of the Interstate Commerce Commission; nevertheless this one railroad property in which every American citizen is a stockholder is very efficiently operated. Now that the Canal has been opened to the commerce of the world, the railroad's im-

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portance will be lessened, but its income will probably still be large.

From 1852 to 1905, inclusive (since 1905 no dividends have been paid), a total of \$36,477,068 in cash and \$2,146,772 in stock was paid to the Company's stockholders. Truly a wonderful record for a 48-mile railroad! The total Gross Earnings from 1849 to 1915 have probably exceeded \$140,000,000.

Now that the Republic of Panama is being opened up, considerable activity in railway building is looked for. A line has been surveyed from David, an important town near the border with Costa Rica, to Empire, Canal Zone, a station on the Panama R. R., about 361 miles. This railway, when built, together with an extension to the Colombian frontier, will form a part of the proposed Pan-American System. The United Fruit Co. operates several short lines in Panama, largely to connect its banana plantations with various seaports. One of the most important of these short railways is the Changuinola Ry. running from Bocas del Toro to Sanchez, etc.

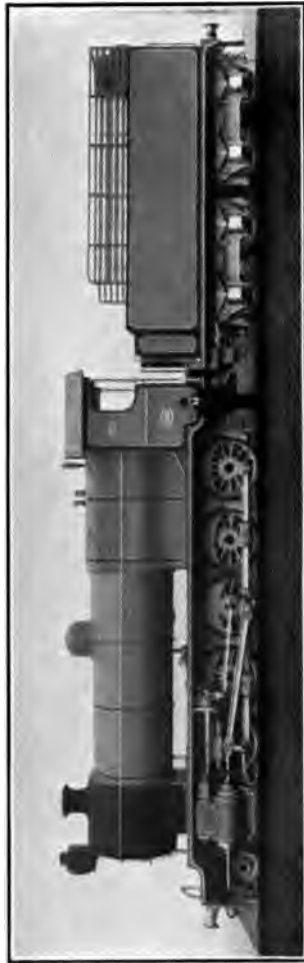
This Republic is blessed with fertile soil, has an abundant rainfall, and is otherwise fitted for extensive cultivation, stock raising, etc. Its increasing cultivation, the great number of tourists which are being attracted to its shores and the cheap labor now procurable owing to the completion of the Canal, are adding and will continue to add to the nation's wealth, making possible railway development which will open up its resources, par-



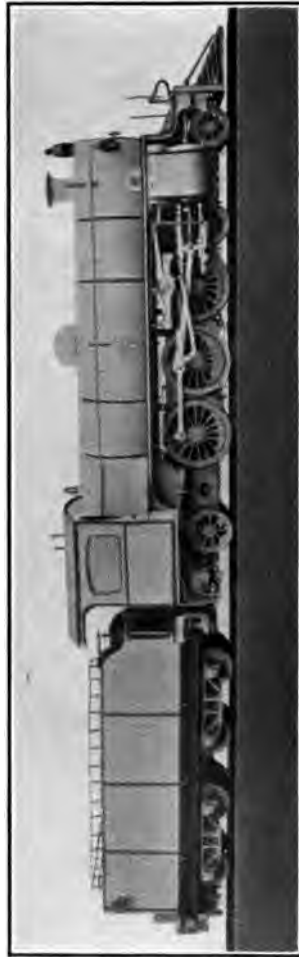
MIKADO TYPE LOCOMOTIVE, BUILT BY AMERICAN LOCOMOTIVE CO. FOR FREIGHT SERVICE IN ARGENTINA.



MALLET TYPE LOCOMOTIVE, BUILT BY BALDWIN LOCOMOTIVE WORKS FOR SOROCABANA R.V., BRAZIL.



DECAPOD LOCOMOTIVE, BUILT BY ROBERT STEPHENSON & CO. FOR
ARGENTINE GREAT WESTERN RY.



PACIFIC TYPE COMPOUND LOCOMOTIVE, BUILT BY HENSCHEL & SON FOR
BUENOS AYRES PROVINCIAL GOVERNMENT RY.

ticularly those of the interior uplands. Panama is not without mineral wealth, as gold exists and is mined, while silver, lead, aluminum and asbestos have been variously located. Copper and coal have been found near Bocas del Toro and Golfo Dulce, salt near Aguadulce, manganese at Nombre de Dios, lignite on the Canal zone, and iron in variable quantities nearly everywhere throughout the Isthmus. In regions of former volcanic activity numerous thermal medicinal springs are found.

The area of the Republic is 32,380 square miles, and the population in 1910 was 419,029. The total length of railways in operation in 1913, including the Panama R. R., the United Fruit Co.'s railroads and other narrow gauge private lines, with the exception of the first named, built largely for the banana trade but carrying publicly both freight and passengers, amounted to about 202 miles.

In December, 1914, it was announced that the National City Bank of New York would take \$3,000,000 5 per cent. 30-year bonds of the Republic of Panama at 97. Of this amount \$750,000 have already been purchased, the proceeds to be used by the Republic to construct a line known as the Chiriqui Ry., to extend from the Pacific port of Pedregal to the Bouquette coffee district, a distance of 60 miles. This section of the Republic is said to be a very rich one and has been settled largely by Americans and British. It is stated that it costs more at present to ship products from the Bouquette district to the coast than from Pedregal to New York, a distance of 2,400 miles.

CHAPTER XII

COSTA RICA.

MINOR F. KEITH AND THE LINE TO SAN JOSE—DESCRIPTION OF
REMARKABLE SCENERY ALONG THE LINE FROM PUERTO
LIMON TO SAN JOSE—THE PACIFIC RAILWAY—
BUILDING A LINE BACKWARD.

COSTA RICA may well be called the Argentina of Central America. It is a live progressive little country, its size being about equal to the combined area of New Hampshire and Vermont. Its 400,000 inhabitants enjoy a foreign trade in excess of \$20,000,000 per annum, and under an enlightened and wide-awake government, have prospered. The United States is the Republic's best customer.

Costa Rica's total railway mileage is about 450, the larger portion of which is owned or leased by the United Fruit Co. The latter company controls most of the mileage east of San Jose, the capital, while the government owns and operates the rail line leading from San Jose to the Pacific Ocean. The United Fruit Co.'s railway mileage in Costa Rica covered, as of June 30, 1914, a total of 354 miles, of which 212 miles were leased from the Costa Rica Ry. Co. The operating company is known as the Northern Ry. of Costa Rica.

The section of the Northern Ry. system, extending from Port Limon to San Jose (103 miles), which the operating company leases from the Costa Rica Ry., was projected at a date prior to 1871, the government having let a contract for its construction to Henry Meiggs, famous the world over as the builder of the Oroya Ry.

in Peru, the highest line in the world. As Meiggs was deeply engrossed in his South American enterprises he had little time to give to this Central American proposition, so he turned the contract over to a nephew, Minor C. Keith. Mr. Keith, who was born in Brooklyn, in the year 1848, and who is now vice-president of the great United Fruit Co., was at the time of receiving the contract but 23 years of age. In the year 1871, except for the short stretch of track which bankrupted Honduras, there was not a mile of railway on the American continent between Panama, which was crossed by the Panama R. R., and the southern boundary of the United States, and Central America was not a field which at that time attracted a great amount of investment capital.

Mr. Keith's task was an extremely difficult one. To reach San Jose from the Caribbean coast a long stretch of deadly swamp country had to be crossed, and then a sharp, steep mountain range had to be climbed. In spite of the obstacles certain to be encountered Mr. Keith set to work to carry out the undertaking. Associated with him were four of his brothers and a number of American engineers, foremen, etc. The laborers were mostly negroes, recruited from Jamaica.

First, a port had to be laid out suitable as a terminus for the railway. The present site of Port Limon, at that time little better than the surrounding swamp land, was selected owing to its excellent harbor facilities. The terminus secured, the road builders began to carry the track westward. Under conditions similar to—perhaps

even worse than—those met with by the builders of the Panama R. R., the construction gangs toiled their way through the fever stricken country. Men died by the hundreds—it is said that 4,000 fell, and among the victims were three of Mr. Keith's brothers. At one time pay was slow in forthcoming, owing to the temporary financial embarrassment of the Government, and Mr. Keith had great difficulty in preventing the collapse of the enterprise. Nearly three-quarters of a year passed ere the money was turned over to the contractor, yet so great was the faith his men had in him, he was able to hold almost his entire force together during this trying period. Finally, after years of struggling, the low country was traversed and the foothills of the range reached.

In 1886 the Costa Rica Ry. Co. was incorporated in London, and under one of the conditions of the Costa Rican Government Conversion Loan of 1871 and 1872, took over the then completed sections of the railway, viz.: from Port Limon to Carillo, 71 miles, and from Cartago to San Jose and then northward to Alajuela, 26 miles. The company undertook to complete the main line and through train service from the coast to the capital was commenced on December 25, 1890, just nineteen years after the laying of the first mile of track.

In 1905 the Northern Ry. of Costa Rica leased for a period of 95 years the lines operated by the Costa Rica Ry. In 1914-15 the former paid to the owners of the latter property, under the terms of the Working

Agreement between the companies, the sum of £149,100 as rental, an amount sufficient for the Costa Rica Ry. to meet the interest and sinking fund requirements on its three issues of Debentures (£1,548,000 outstanding June 30, 1915), and also to pay a dividend of 2% on £1,800,000 Ordinary Stock.

The entire line of the Northern Ry. of Costa Rica (owned by the United Fruit Co.) including the leased Costa Rica Ry. is of 3 feet 6 inches gauge, well constructed and well ballasted. Steel and iron bridges span the various streams crossed by the railway lines, while excellent station facilities and sufficient equipment, yards, sidings, etc., have been provided. Bananas and coffee are the principal commodities handled by the railway.

The scenery encountered along the route between Port Limon and San Jose is wildly picturesque and has attracted the attention of numerous tourists. A most graphic description of the journey has been written by the well known author of sea tales, the late Captain Frank T. Bullen, F. R. G. S. This article is here reproduced in part.*

"We passed the customs inspection successfully, wondering much what on earth we might have smuggled into this country with any pleasure or profit to ourselves, and were presently snugly housed in a train in the 'primero class.' . . . We knew presently that we should soar and keep on soaring until the very knowledge of the sweltering lowlands should be forgotten.

*"Back to Sunny Seas," by Frank T. Bullen, F.R.G.S. London: Smith Elder & Co.

So we possessed our souls in silence through the millions of acres of bananas growing as far as the eye could reach on both sides of the line for the delectation of down-Easters, for was not this fruit growing at the bidding of the all-embracing United Fruit Co.? In no other place that I have visited have I ever seen such an enormous crop of bananas, and at every little begrudged clearing there were immense heaps of the fruit piled awaiting shipment, or a string of cars already loaded and ready to be coupled to the downward bound train. Then presently we felt, by the panting of the engine—that we were ascending, and on a pretty steep gradient, too. Almost immediately the character of the country began to change, the air began to freshen, and scenes of beauty to peep in between the dense foliage on either side of the line. Here I must say that except on a funicular railway I never saw such high gradients essayed by locomotives as on this line. It is true that the load was light, but still the performances of the wee engine filled me with admiration.

“As we climbed steadily, the views we obtained above, below, around us steadily increased in beauty. The line wound its way along the banks of a torrential river, only losing sight of it at rare intervals, and always coming back to it again at an increased altitude. In the bed of this torrent the boulders were worn bare and polished, in striking contrast to the universal garment of green with which the kindly forces of nature had clothed every place that would otherwise have been bare. Dense

forests clothed the sheer mountain sides, descending sometimes 2,000 feet to their bases in the bed of the stream, and here and there the varid tints of green would be suddenly lit up by a glare of gold, the foliage of some amazingly splendid forest tree braving it among its more sombre fellows. Then, as we still climbed upward, the daring course of the line claimed painful attention. At times we seemed to be overhanging the abyss, at the bottom of which foamed and sparkled the impetuous stream, silent now as far as we were concerned, because of the distance we were above it. And now we reached the coffee country, where on slopes so steep that it seemed miraculous how the good old earth could remain without being washed away, the far-famed Costa Rica coffee was growing luxuriantly, and on plateaus of concrete carefully leveled, the fruit was drying in the sun preparatory to its being husked and bagged for export to the coffee-drinking world. Up here we revelled in the sweetness of the air, the wonderful effects of light and shade produced by lingering clouds, and realized that we were in white man's land indeed. There was also a more settled air about the country, as if here a more settled government held sway, encouraging men to work in the belief that the toil of their labors would not be swept away from them in a moment by some insensate revolution putting the clock of progress back at least half a century.

"Higher and higher we climbed round apparently impossible curves, and across spider-web bridges, at

every turn finding new beauties reveal themselves to our delighted eyes, until at last, after a journey of six hours which had passed so rapidly as to seem shorter than that between Colon and Panama, we suddenly came in sight of Cartago, the ancient capital of Costa Rica (I use "ancient" in a modified sense). It was an exceedingly picturesque old town, evidently built with a view to the possible recurrence of earthquakes (the city was practically destroyed by an earthquake in 1910—F. M. H.), for the houses were mostly of one floor, and stretched away in long lines, each almost exactly alike. But they were embodied in greenery of a wonderful character, and surrounded by a country that, but for its palms, very strongly reminded me of Devonshire. * * * Here we stayed for about fifteen minutes, and then departing span along a very gentle descent into San Jose. By the time we arrived, we were ready to enjoy to the full whatever in the way of sights the capital of Costa Rica could offer us, for the sweet freshness of the air was exhilarating as that of a spring morning in dear old England. I mean, of course, a really fine spring morning. * * *

"Indeed, I found it hard to realize that I was in the centre of a Central American Republic as the day wore on, and I saw telephones in every house of any consequence, and electric lights blazing everywhere. But the climate, the delicious life-giving air that one imbibed with every breath, was the chief

delight! I could not weary of noting it so short a distance from the steamy tropical lowlands. Presently we passed the National Opera House, a most magnificent building built on the model of the Paris Opera House, at a cost of about £250,000." * * *

Capt. Bullen, after remarking further on the attractiveness and enterprise of the city of San Jose, describes his return journey, making special note of the careful manner in which the train is handled on the heavy downgrade.

The journey from coast to capital takes between five and six hours. Trains, carrying observation parlor cars, are run daily in each direction.

San Jose is also in direct rail communication with the Pacific Coast, and thus virtually is the center of a direct ocean to ocean route, although through passenger train service is not maintained between the two coasts. The Pacific Ocean is reached via the Government owned Pacific Ry. of Costa Rica, which runs from the capital to the port of Puentarenas, 69 miles away. This line, which surmounts a series of fairly heavy grades, was completed in 1910 (see next paragraph). Washouts along the line have been frequent during the rainy seasons. In 1912 practically the entire line suspended operations for a considerable period owing to the closing of the Cambalache Tunnel. The railway maintains daily train service between San Jose and Puentarenas, the journey taking about five hours and twenty minutes. The port

at which the railway has its terminus is growing in size and importance. The harbor facilities are fairly good, the depth at low water, however, being only about 15 feet, necessitating the use of lighters.

Work on the "Pacific Ry." was commenced back in the 70's under the personal supervision of President Guardia. This gentleman, it is said, had never seen a locomotive in his life. He began the undertaking by ordering all the rolling stock, rails, joints and other supplies which had been landed at Puentarenas after a long voyage from England via Cape Horn, to be carried or dragged to San Jose by mules. His orders, given to prevent, it is alleged, a revolution threatened by the mule drivers, were carried out. Rolling stock, etc., had to be taken apart, and nearly every mule in the Republic called into service. This undertaking was almost as costly as the construction of the entire railroad and it was not surprising that the Government soon ran out of funds. The sections of the road built by Senor Guardia (he also constructed a few miles of line from Puentarenas inland) were not finally joined together until the year 1910.

The railway's earnings are quite large. According to a recent estimate of the Government the expected profits for 1915 will be about 772,000 colones, equal to about \$356,670 U. S. gold.

CHAPTER XIII

NICARAGUA AND SALVADOR.

RAILWAY PROJECTS IN THE TWO REPUBLICS—TRADE OF SALVADOR.

THE Republic of Nicaragua has an area of about 49,200 square miles and a population of between five and six hundred thousand. The Western section of the Republic is the most progressive and contains fully three-fourths of the inhabitants. Communication between eastern and western Nicaragua is greatly restricted owing to the scarcity of roads and entire lack of railway facilities. Indeed most travellers between the Caribbean ports and Managua, the capital, prefer to take the rail route across Costa Rica or else go via Panama.

The commercial progress of Nicaragua has not been as rapid as has the progress of its neighbors, Costa Rica, Guatemala and Salvador. The exports and imports, for 1913, were valued at about \$13,500,000 (about 57% of the total represented exports). The United States, Germany, France and Great Britain are the principal nations trading with this Central American Republic.

There are only about 200 miles of railway lines operated in Nicaragua. The principal line is the Pacific R. R. of Nicaragua, which has its Pacific terminal at the Republic's principal port, Coriento, which port handles three-fifths of the country's freight trade. The railway, since June 10, 1912, has been controlled

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by the American banking firms of Brown Bros. & Co. and J. & W. Seligman, and has been operated by the J. G. White Co. of New York. The company has \$3,300,000 stock outstanding. Prior to its acquisition by the New York firms the railway was operated as the National R. R. of Nicaragua. The road was largely built between the years 1883 and 1890, but was not finally completed until the year 1903. The construction cost of the first 90 miles of line which was built between the years 1883 and 1886 amounted to \$2,005,584 (this sum also included the cost of some small steamboats).

After leaving Corinto the railway follows the Pacific Coast in a northwesterly direction for a short distance and then strikes northeasterly through a pretty stretch of country to Chinandegua (population 12,000). Leaving the latter city the line abruptly turns in a southeasterly direction running to Leon, which is the largest city in Nicaragua (population 45,000), Managua, the capital (population 35,000), Granada (population 30,000), and Dinamba. The railway, including a short branch mileage, operates 163 miles of road. The gauge used is three feet, six inches, the maximum gradient 2.8% and the rails from 30 to 40 pounds. The company maintains steamboat lines on Lakes Managua and Nicaragua.

There is a small mileage of railway lines in eastern Nicaragua, mostly built to provide a coast outlet for various plantations. A railway, about 112 miles in

length is projected from the Caribbean coast to Lake Managua, also a line is partially graded from Bluefields (on the Caribbean coast) to Rama on the Siquia River, continuing from that town to a point on Lake Nicaragua, probably San Ubaldo; the length of the line to be about 150 miles.

The Pan American Ry. (International Rys. of Central America) will of course traverse the Republic and will likely use the Pacific R. R. of Nicaragua's tracks between Chinandegua and Grenada.

SALVADOR.

The two railways at present in operation in the Republic of Salvador are the "Salvador Ry." and "International Rys. of Central America." The former line runs from San Salvador, the capital, to the port of Acajutla, with a branch to Santa Ana, etc. (total mileage 100), while the latter railway is building from La Union to the frontier with Guatemala, where it will meet its lines operating in the latter Republic. An English Company has recently made the Government a proposition to build a railway from San Salvador to the Port of La Libertad. The total length of railways in operation December 31, 1914, was estimated at 184 miles.

The little country has an area of 7,225 square miles (somewhat smaller than the State of New Jersey) and a population of about 1,700,000. Its exports, mainly coffee, were valued in 1914 at \$10,796,495, and its imports at \$4,958,624.

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The Salvador Ry. is the most important line in the Republic. The company was incorporated August 7, 1895, and acquired from the Central American Public Works Co. about 73 miles of road. The main line was completed April 15, 1900. During the twelve months ending June 30, 1914, the company reported gross income, including £24,000 Government Subsidy, of £156,914. Dividend of 6% and 2% respectively were paid on the company's preference and ordinary stocks (£250,000 of each class outstanding). Bonds and Debentures to the amount of £872,200 are also outstanding. During the year a total of 296,425 passengers and 80,493 tons of freight was handled. Receivers were appointed for this company during 1915.

The Salvador Ry. operated until recently a steamship line and had three steamers, each of about 1,000 tons burden, and having accommodations for 24 passengers. Service was, prior to the war, maintained between Salina Cruz, Mexico, and Corinto, Nicaragua, calls being made at all intermediate ports in Guatemala, Salvador and Honduras.

The International Rys. of Central America's line in Salvador forms a portion of the contemplated through route between the Mexican frontier of Guatemala and Panama. About 84 miles of road in Salvador had been completed in 1914, while additional mileage had been graded or surveyed, the surveys having been carried as far as San Salvador, the capital. Gross earnings of the incomplected Salvador Division of

the Railway in 1914 were \$77,710, and Operating Expenses \$104,765. Six locomotives and ninety-six cars were in use on this division. A detailed description of the operations of the International Rys. of Central America will be found in a later chapter.

On March 24, 1914, a contract was let by the Salvadorian Government, to construct for its account a line from the Port of La Libertad to the town of Santa Tula, about 26 miles. The estimated cost of the line will be about \$40,000 a mile and it is expected it will be opened for operation in 1916. An extension to San Salvador is projected.

CHAPTER XIV

HONDURAS.

THE STORY OF THE HONDURAS INTEROCEANIC RY.—A REMARK-
ABLE LOAN—BANKRUPTING A REPUBLIC—WEALTH OF
HONDURAS—\$125,000,000 DEBT ON A 57
MILE ROAD.

IN the year 1849 the gold rush to California commenced. From every section of the United States east of the Mississippi River men left desk or plough and set forth for the great Eldorado. The various routes to the Golden Gate were not paths strewn with roses, for over the great prairie lands of our western states roamed thousands of hostile Indians. The other way to reach California was via the sea, and this meant a long, tiresome journey in a slow-going ship around stormy Cape Horn and up the west coast of South America. Transportation and freight rates were prohibitive, in fact so high were freight rates that necessities such as food and clothing sold in San Francisco at from ten to fifty times regular prices. Realizing that a large amount of traffic would be assured if a short cut from ocean to ocean could be opened the financiers of eastern United States began to look about for suitable routes for trans-continental railway lines. Thus it was that the Panama R. R., across the Isthmus of Darien, came into existence and thus it was that the Inter-oceanic Railway of Honduras was conceived.

This latter railway was projected in 1850 by E. G.

Squier, then a United States Consul in Central America, and subsequently famous on account of his wonderful books on the Latin Republics. He conceived the idea of building a railway across Honduras, starting at Puerto Cortez, which is located on one of the best harbors in Central America, to a point on the Bay of Fonseca on the Pacific side of the Republic (about 250 miles). In 1853, Mr. Squier formed a company but met with great opposition from the then owners of the Panama R. R. Finally in 1858 the line was surveyed under the direction of General Wm. W. Wright, and some preliminary work done at a cost of about \$400,000, which expense was borne by the Directors.

Every effort was made by Mr. Squier and his associates to obtain funds to carry out the undertaking. Troubles came thick and fast, and as a climax the Civil War in the United States broke out. This caused the abandonment of the enterprise, and the company finding the situation hopeless allowed its concession to lapse. The financial loss amounted to probably half a million dollars.

In the year 1867 the Government of Honduras, realizing the necessity of the building of this railway, contracted a loan in England for £1,000,000. The bonds were issued at 80 per cent., bore interest at 10 per cent, and were secured by the railway and its revenues, and upon the mahogany forests of the Republic. The Government undertook to provide an

annuity of £140,000 from 1870 to 1884 inclusive and promised the subscribers half the profits of the projected railway for fifteen years after the redemption of the loan.

In 1869 another loan, bearing at $6\frac{2}{3}$ per cent., was issued in Paris at 75 per cent. The amount of this loan was £2,490,108 (\$12,450,540). It was secured by a mortgage on the railways and forest lands, and was redeemable at par in seventeen annual installments.

In 1870, a third loan was contracted, secured by the railway and the produce of state domains. This loan, like the one of 1867, bore interest at 10 per cent., and further was to be provided with a Sinking Fund of 3 per cent. per annum.

In the meantime, work was started on the railway (during 1868) and the track was laid for about 57 miles at a cost of not over \$26,500 a mile, or a total of about \$1,500,000. The Government's terms to those who were constructing the road were most liberal, granting ten square miles of land for every mile of road built and other privileges. The contractors were also permitted to authorize the Government to issue bonds on the completion of a stated mileage. The government's belief in the good faith of the builders was such that it failed to stipulate the amount of bonds to be issued. The result was that advantage was taken of the situation, and the three issues of bonds totalling nearly \$30,000,000, as described above, were "marketed," the purchasers,

without intimate knowledge of the circumstances, being attracted by the lucrative return. The outcome of this "financing" was not hard to foretell, and in 1873, all three bond issues, together with another loan (about £75,000) which had been made in 1867 by the Republic, but which had nothing to do with the railways, went into default, the interest on the railway loans having been paid mostly out of principal. The redemption fund had, up to that time, reduced the debt to £5,398,570 (\$26,992,850).

Thus the unfortunate little country found itself saddled with an enormous debt, far beyond its means to repay, and without any funds to continue the building of the ill-fated railway.

Various attempts have since been made by the Government to settle with the bondholders, but without avail. In 1887 a Mr. Binney, who was then Consul General of Honduras in London, obtained a concession for the completion of the railway, with conditions which would have enabled the Republic to have settled its obligations in full. The plan called for the exchange of the defaulted bonds with arrears of interest for £100 shares in the railway company incorporated to take over the enterprise. For lack of funds this plan fell through in 1892.

Later, in 1897, a concession was granted to the "Honduras Syndicate," an American concern, which soon became involved in a series of wrangles with the bondholders' committee. And finally, on May 26,

1903, the Government took over the existing railway and ran the same for a short period, when it was again sublet at a nominal rental.

Meanwhile, the partly completed railway, which was constructed in a manner calculated to make the average engineer throw up his hands in horror, was allowed to fall into deplorable condition. A bridge across the Chamelicon River collapsed and lay in the stream for upwards of a dozen years, rendering 20 miles of road useless. In 1900 this bridge was replaced, but the railway was not extended nor was its physical condition improved until during the early part of 1912, when the Government of Honduras again took it over. The line was able to report a profit of \$34,289 during the first six months of national control. Part of the road was improved and a large amount of railway material was imported from the United States. The Railway's Gross Revenues for 1913-14 were \$280,346, and the expenses \$273,130. Four passenger trains a week are maintained in each direction.

Plans have been formulated and contracts let to extend the line further into the interior. A bridge has been built over the Uluá River and the line carried on to Protrerrillio. The principal commodity handled by the railway is bananas which are hauled to Puerto Cortes for export. If, in the future, some plan may be formulated whereby it will be found possible to continue the railroad to the Pacific Coast,

a considerable profit will likely be earned. The railway's property was valued in 1914 at \$1,098,071.

The arrangements for the final settlement of the debt have never been completed, and the Republic, although it has vast resources, has been greatly hampered in its development. The £5,398,570 principal and four or five times that amount of interest remain unpaid. That Honduras was the victim of gross fraud is universally acknowledged. Her resources, though considerable, are insufficient to ever repay these obligations, nor will she be able to forge ahead of her sister American Republics until means have been found to raise additional funds. In 1912, a small loan was contracted in the United States. The holders of the Honduras bonds of 1867, 1869 and 1870 are still attempting to arrange a settlement of the debt. The 10 per cent. bonds sold in London during the year 1914 at about ten cents on the dollar.

In October, 1912, a contract was signed by the representative of the International Railways of Central America and the Government of Honduras for the construction of the Pan-American Railway across Honduras (71 miles), connecting Salvador with Nicaragua. This will be especially important for the Departments of Choluteca and Valle, which have both agricultural and mineral resources.

At the close of 1914 the railway of Vaccaro Bros. & Co., banana merchants, consisted of about 105 miles of main line and branches (gauge 3 feet) passing

through an extensive area of rich banana land. The main line extends from Ceiba (population 7,000) where a fine dock is owned, in a southwesterly direction to San Juan, from which point it is being extended toward the seacoast at Boca Cerrada. The line will pass around the northern end of the Aguacate mountains and enter the Lean River Valley near Colorado, up which valley it will pass to Yoro, the chief city of the Department of the same name. This railway handles a fairly large freight and passenger business.

The Tela R. R., incorporated in Delaware, U. S. A., has a concession for the construction of a wharf at Tela, 1,550 feet long and 40 feet wide; also a line of railway to extend from Tela, in a southwesterly direction to Progreso (54 miles). About 38 miles of branches will also be constructed. The railway, which is of 3 feet 6 inches gauge, is partly completed. It will traverse the rich banana lands in the Ulua River district and is assured of a large permanent traffic.

The United Fruit Co., as of September 30, 1914, owned in the Republic of Honduras, 134 miles of railways and 5 miles of tramways. Fifteen locomotives and 247 cars were likewise owned, the railways and tramways with equipment being valued at \$2,770,828 and \$16,449 respectively. Altogether the United Fruit Co. had invested to September 30, 1914, a total of \$5,358,906 in its Honduras properties. The acre-



Courtesy of "The South American."

DEVIL'S ELBOW. NORTHERN RAILWAY OF COSTA RICA.

CHAPTER XV

GUATEMALA AND BRITISH HONDURAS.

WEALTH OF GUATEMALA—THE LINE TO GUATEMALA CITY—THE
INTERNATIONAL RAILWAYS OF CENTRAL AMERICA—
BRITISH HONDURAS.

THE Republic of Guatemala, comprising an area of 48,290 square miles, contains approximately two-fifths of the population of Central America. Its 2,200,000 inhabitants are largely engaged in agricultural pursuits, the Republic exporting a large amount of coffee, bananas, etc. There are upwards of 500 miles of railway in the Republic, approximately 443 miles of which are operated by the International Railways of Central America controlled by United Fruit Co. interests.

The International Railways of Central America was incorporated in April, 1912, and is a consolidation of the Guatemala Railway, the Guatemala Central Railway, the Occidental Railroad and the Ocos Railroad. The company's lines as they at present exist extend from Puerto Barrios on the Caribbean Sea to Guatemala City (capital of Guatemala), 194.5 miles thence to San Jose on the Pacific Ocean (74 miles), with a branch from Santa Maria through an extensive coffee growing district to the city of Mazatenango (60 miles), thence to the Pacific port of Champerico (42 miles). The main line connects at Las Cruces with a 54-mile extension which runs to

the Mexican frontier at Ayluta, where it connects with the National Railways of Mexico's line to Vera Cruz—and thence to the port of Ocos. The company has under construction a line to the Salvador frontier, where it will connect with the Salvador Division of the railway. Of the Salvador Division, 84 miles have been completed (La Union to the Lempa River). The total mileage operated by the International Railways of Central America, as of March 1, 1915, was 527 miles (443 miles in Guatemala). When this and various other lines in Central America, which are being constructed by interests in control of this company, are completed, a direct through route will be afforded between Vera Cruz in Mexico and Panama and Colon, extending along the Western portion of Central America through Guatemala, Salvador, Honduras, Nicaragua and Costa Rica; also Panama. A number of branch lines will be operated including two lines to the Atlantic Coast (in Guatemala and Costa Rica).

The International Railways of Central America has assumed the obligations of the merged companies and has authorized \$30,000,000 common stock, \$10,000,000 5 per cent. preferred stock and £4,500,000 5 per cent. bonds, due 1972 (£1,000,000 issued in 1912). In August, 1912, an initial quarterly dividend of $1\frac{1}{4}$ per cent. was paid on the \$10,000,000 preferred stock. The 5 per cent. rate was maintained until late in 1914 when the European war caused the company

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to suspend payment until conditions should improve. The preferred stock is entitled to share equally in all dividends paid in any year after 5 per cent. has been paid on both issues of stock.

In addition to £1,000,000 5 per cent. bonds sold in 1912, the company has issued £3,500,000 Central Division Purchase Money bonds. These bonds are secured by a mortgage on the Guatemala Central Railroad, subject to the latter's \$2,500,000 6 per cent. bonds due 1916, and bear interest at the rate of 5 per cent. per annum.

A contract has been entered into with the United Fruit Co., whereby the railway will handle all the products of the Fruit Co., raised in the territory served by the railway. Bananas and coffee are the principal commodities handled.

The gross earnings of the railway for 1913 (latest available) were \$2,461,797 and the surplus was \$723,411. In 1912 the surplus was \$820,891.

The company receives subsidies from the Governments of Guatemala and Salvador varying from \$3,200 to \$7,320 per kilometer. The Government of Guatemala may purchase the lines in that Republic after 2,002 at a price to be decided on by arbitration. In Salvador, the Government of that Republic may purchase the lines located there after June, 1978, at an arbitrated price; or after 2,006 the Government may take over these lines without indemnity.

The section of the International Railways of Cen-

tral America extending from Puerto Barrios to Guatemala City (formerly known as the Guatemala Railway) was projected a number of years ago by the late President of the Republic Rufino Barrios. Work on the undertaking commenced in 1892; in 1894 the line was completed from Puerto Barrios to El Rancho (129 miles). At this point the Government, owing to lack of funds, was compelled to suspend operations and the property was leased to a private company. Business did not come up to expectations and company, to make ends meet, had to run the road without charging anything up to maintenance expenses. The result was that the line soon went to rack and ruin. Finally the general condition of the railway became so deplorably bad that operations of trains had to be practically suspended. A slow going passenger and mail train was run about once a week in each direction providing bridges were not down or sections of the track washed away. Under ordinary conditions this train took two days to make the 129-mile journey. In the year 1902 plans were laid to reconstruct the line and likewise to continue it to Guatemala City. The building of the new mileage required some heavy engineering, the country traversed being extremely mountainous. This section of the line abounds with wide curves, cuts and fills, and there are a number of tunnels. The first train was run from the Caribbean coast to the capital in 1908.

The Guatemala City to San Jose (on the Pacific

Ocean) line operated by the International Railways of Central America, formerly known as the Guatemala Central Railroad, was constructed by the late C. P. Huntington and associates. It handles a considerable amount of freight and a fair number of passengers. The railway has some heavy grades to encounter, over one section of thirteen miles a climb of twenty-five hundred feet being necessary. Wild gorges and rushing streams are crossed at numerous intervals, and the scenery is generally very striking. The journey from ocean to capital is an enjoyable one for tourists, although no speed records are broken.

The Verepaz Railway (a German owned company), whose lines are about 28 miles long and form the outlet for the coffee of the Coban region, owns and operates also the steamboat and barges for transportation by water from the railroad terminus at Panzos, on the Polichic River, by way of this river and Lake Izabal and the Dulce River, to the Atlantic port, Livingston. The railway runs from Pancajche to Panzos.

In addition to the railway lines previously described there are about 47 miles of railway and about 144 miles of tramways operated by the United Fruit Co., affording connections with their banana plantations. The railways represent an investment of \$1,177,570, and the tramways an investment of \$378,560. The United Fruit Co. had expended to September 30, 1914, \$4,970,325 on its Guatemala investments.

A railroad is being built by the Government of

Guatemala between Quezaltenango, second city in size in the Republic, and San Felipe, which is the terminus of a branch of the International Railways of Central America. The new line is to be about 40 miles in length when finally completed, and a large portion of it has been graded.

BRITISH HONDURAS.

Great Britain's little Central American colony—area 8,598 square miles, population 45,000—has only a small railway mileage. The colony has an extension coast line and several navigable streams and therefor has but little need for railways. A few years ago a line was projected from Belize the capital, to the boundary with Guatemala, about 70 miles. A company was formed to carry out the enterprise, the Government offering a large land grant for each mile of line constructed. A survey was carried out, but the cost of the line was found to be prohibitive, and the enterprise was abandoned. Recently the Government constructed a 25-mile line known as the Stann Creek Railway, from the town of Stann Creek to the foothills of the Cockscomb Mountains. Near Stann Creek, which is an open roadstead, a port has been constructed, and, thanks to a breakwater, steamers may load and unload in safety at the railway's pier. The cost of this railway, pier, etc., was in excess of \$1,500,000. A fair traffic is handled consisting of bananas and lumber, also a limited number of passengers are carried. A short branch into some agricultural lands is projected.

CHAPTER XVI

OUR OPPORTUNITY TO ESTABLISH TRADE AND CREDIT RELATIONS WITH SOUTH AMERICA.

[Note.—This chapter appeared in "Trust Companies," September, 1914.]

SOUTH AMERICA is bound to realize that unless she looks to new channels for trade and capital to offset the consequences of the existing European conflict, her purchasing power will be curtailed, her finances crippled, and she will otherwise suffer, inasmuch as a stop will be put to the expansion of railways, so necessary to the development of new countries.

Fortunately for us our recently enacted Currency Bill provides for the establishment of branch banks in foreign countries. The National City Bank of New York and one or two western banking institutions have taken the initiative in South America, but there is abundant opportunity for others to follow. Our banks and trust companies should immediately co-operate and join with our manufacturers and merchants and thoroughly canvass the possibilities existing in this great field. More branch banks should, as stated, be established; perhaps it would be well in establishing these branches to have the stock in each of them held jointly by a number of our banking institutions.

The existence of the Panama Canal will give New York and Philadelphia an advantage of 2,300 to 3,000 miles over the principal European ports in competing for the trade of the west coast of South America;

formerly via the Magellan Straits New York was further from the ports of Chile and Peru by water than was southern Europe. The increased number of steamships which have registered under the American flag will likewise greatly aid us commercially.

During the past four or five years our relations with the Latin Republics have steadily become more cordial. The friendly spirit shown by the then Secretary of State Elihu Root, and later by ex-President Roosevelt during their respective visits to South America, has had a splendid moral effect; likewise the excellent educational campaign carried on by the Pan-American Union at Washington under the able administration of Hon. John Barrett and his associates, has greatly aided in bringing about a better understanding between the various countries. The tributes of respect paid by the United States to the memory of the late President Montt of Chile, who died while on a visit to North America, won the friendship of the latter republic. The crowning act was, however, the invitation extended by Secretary of State Bryan to the so-called "A. B. C." republics to arbitrate the Mexican troubles.

Engrossed in working out our own destiny, until recently we almost entirely lost sight of the fact that to the south of us lies a great continent on which flies the flags of ten republics, moulded at least in the same spirit of liberty as our own nation, the spirit of revolt from the divine right of kings. In the

early days of the 19th century the South Americans worshipped us blindly. Washington, Greene, Lafayette and the other soldiers of American liberty were their ideals, inspiring Bolivar, San Martin and other heroes—and they were heroes in every sense of the word—to deeds which enabled them and their followers to win independence.

For many years the splendid Yankee clipper ships were everywhere seen in South American waters and the trade of that continent was largely handled by these vessels. When the Civil War destroyed or scattered our merchant fleet, causing the Stars and Stripes practically to disappear from their seas, the United States became a less important factor in the trade of South America and our prestige dwindled away.

As the Latin Republics emerged from the long era of chaos and revolution which followed after the yoke of Spain had been thrown off, they began to look for means of developing their vast resources. The United States, as stated, had insufficient capital for its own needs and could not render assistance, so that Europe became the medium for furnishing South America with the necessary financial aid.

Following the inflow of foreign gold, the South American countries, especially Argentine, Brazil, Chili and Uruguay have expanded their trade and developed their resources at a wonderful rate. Over fifty thousand miles of railway have been constructed, mostly in the past decade, while there have sprung

up large cities, adorned with magnificent buildings, fine parks and boulevards, and served by splendid tramway lines and lighting systems. And yet the surface of the 7,200,000 square miles of territory has barely been scratched.

Prior to the outbreak of the existing European conflict, the annual foreign trade of South America had increased to approximately \$2,160,000,000 (total for year 1912—trade during 1913 somewhat larger), of which amount \$1,185,000,000 represented exports and \$975,000,000 imports. Five-sixths of this trading was done by Argentine, Brazil, Chile and Uruguay.

The total trade of South America for the year 1912 with the four principal countries concerned was approximately as follows:

	Exports to	Imports from	Total
Great Britain.....	\$269,000,000	\$275,000,000	\$544,000,000
United States.....	*215,000,000	145,000,000	360,000,000
Germany.....	156,000,000	177,000,000	333,000,000
France.....	103,000,000	83,000,000	186,000,000

*Includes \$95,000,000 value of coffee and \$40,000,000 value of rubber purchased from Brazil.

Belgium's share in the South American trade amounted to approximately \$100,000,000, having bought more from Argentine and Uruguay than did the United States. As over one-half of South America's trade is with the nations now at war, and as a large portion of this trade will of necessity be cut off, our opportunity may be seen at a glance, providing we proceed in the matter intelligently and system-

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atically. European countries have, of course, had a considerable advantage during the past. Numerous steamship lines; a large chain of strong banks; willingness to extend long credit so necessary in South American trade; large amounts of invested capital in railroads, tramways, lighting plants, docks, warehouses, etc.; good trade organizations; established business houses, and the placing in the field of salesmen and others thoroughly understanding their language and trade conditions have enabled England, Germany, and other Old World powers to secure the lion's share of the business of the Latin Republics.

The United States has had but few of these advantages in the past. A number of our merchants have of course traded with South America for years, while fair sized amounts of our capital have been invested in the mines of Chile and Peru. Yankee enterprise has recently been noticed in the development of railways throughout Bolivia, Brazil and Ecuador, otherwise our financial interests south of the Panama Canal have been but nominal. Many of our manufacturers have wasted time and money in sending broadcast catalogues, trade lists, etc., printed in English and utterly useless owing to the difference in the languages spoken.

This article has dwelt largely with conditions as they were in the past and as they are today. What of the future needs of South America? If the United States is to invest in South American securities and

enterprises a publicity campaign must be established by our bankers and others likely to be vitally interested, in order to convince the investor that his or her money may safely go into this new channel. Investigation will show that each South American Republic is in itself a storehouse of undeveloped wealth.

Venezuela, Colombia and Ecuador, although their combined area is equal to one-third of the area of the United States, have between them less than 1,500 miles of railways, and yet these republics have vast resources of almost every description. Venezuela's extensive coast line and likewise its great commercial highway, the Orinoco River, are easily accessible to the United States. The republic today has a population of only 2,800,000; properly developed it could sustain 25,000,000 inhabitants. The vast plains known as the Llanos, which lie in the central portion of the country, are splendidly adapted for the raising of cattle—millions of steers could thrive there; while numerous valleys are adapted for agricultural development.

Colombia is assuredly the land of opportunity. Nature has been bountiful in its gifts to this country. Oil, minerals of nearly every kind, products of the forest, and lands capable of raising excellent crops may be found; in fact, nearly one-third of the area of the republic might be brought under cultivation. Coal of an excellent quality has been discovered in large quantities; its development awaits the coming of im-

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proved transportation facilities. Railroads are sadly needed in Colombia, while some of the larger cities are offering inducements to capitalists to establish street railway lines, lighting plants, water systems, etc.

Ecuador, so near the Panama Canal, offers great possibilities along certain lines, provided better means of interior communication are established. Fully one-half of the republic's area lies east of the crest of the Andes; as yet this vast territory, known as the Oriente, has been explored but little; sufficiently, however, to prove that it contains untold forest wealth. Railways must of course be built into this tract of country to insure its development; one line is already projected.

Peru, lying directly south of Ecuador, has a coast line which equals the distance from Maine to Georgia. Its arid coastal lands a short time ago looked upon as almost a worthless desert, have been found to contain oil and petroleum in paying quantities. One of Peru's harbors—Chimbote—long neglected, and today used but little, could safely hold all the navies of the world. No great distance inland from this port, an extensive coal deposit has been found; into these coal fields a railroad could readily be built, there being but one real engineering difficulty along the route. Although the mines of Peru have been worked since before the days of Julius Cæsar, there are still vast quantities of minerals on the plateaus and slopes of the Andes. Inducements are being offered to promote more railway construction, so that the country may be further opened up. Peru's forest lands lying east

of the continental divide are but little explored and offer great prospects for the future.

Bolivia's resources are not unlike those of Peru. Better railway facilities than in the past, and the actions and enterprise of an enlightened government, are placing the wealth of this vast yet thinly settled republic within reach of foreign markets. Although most of the country's development has taken place within its great central plateau, where most of the mines are located, the greatest future opportunities exist among the plains in the eastern and southern part of the Republic. The area of possible cultivation in this section of the country covers many thousands of square miles, and nearly every product of the torid and temperate zone may be successfully grown. Among the forests of this lowland region may be found mahogany, ebony, rosewood, satinwood, cedar, rubber, cork, etc.

Chile, extending as it does from the boundaries with Peru to stormy Cape Horn, has a coastline equal in length to the distance from St. John's, Newfoundland to the northern boundary of Brazil. The Republic is settled by one of the hardiest and most industrious races in the Americas and has progressed wonderfully within the past few years. Its greatest wealth is in its nitrate fields, although copper, iron and other minerals abound. The Tofo iron mines, about to be developed by the Bethlehem Steel Corporation, contain it is estimated, upward of 185,000,000 tons of 69 per cent. ore, which, it is

stated, can be placed aboard ship at a cost of less than 20 cents a ton.

The Republic of Argentina stands today foremost among the South American countries. Although it is by far the best developed of the ten Republics and boasts of a larger foreign trade than the Empire of China, more capital will be needed from year to year to build new railways, grain elevators, mills, etc. Argentine is today the richest nation per capita in the world, yet it could maintain within its boundaries twenty times the present population. The Republic's production during 1912, in spite of a population of only 7,000,000, exceeded one billion dollars.

Uruguay, which is and which likely will continue to be primarily a cattle country, wants meat product factories and refrigerating plants, and will doubtless need additional railway lines in the future.

Paraguay, heretofore, spoken of as a country behind the age, has fully awakened to its possibilities and in consequence is beginning to move forward by leaps and bounds. The Republic, tiny as it looks on the map, is larger than California and Ohio combined. It has direct rail and river communication with Buenos Ayres and will soon be connected by rail with the Brazilian sea-coast.

Lastly Brazil, for nothing will be said here about the three Guianas other than that they are rich countries, is the largest Republic in South America—it is in fact

larger than the United States, excluding Alaska. The great wealth of Brazil, at present developed, lies in two products, coffee and rubber; five-sixths of the nation's exports being made up of those two commodities. Volumes would be needed to tell of the resources of and the opportunities existing in this great Republic.

One enterprise which will involve the continent as a whole and which is still more or less a dream of the future has for a long time attracted attention. The so-called Pan-American Railway is projected to form an all rail route from New York to Buenos Ayres. At the present time a number of sections of this future through line are in operation or under construction. These sections are of such a variety of gauges, however, as to be practically useless for the purpose of through communication. The completion of this line will place New York within a little more than two weeks' journey of Argentina;—it is questionable, however, if many persons will have the endurance to make the trip. The route proposed passes through the United States, Mexico, Central America, Panama, Colombia, Ecuador, Peru, Bolivia and Argentine. If this railway, or rather combination of railways, serves no other purpose, it will at least do much to foster Pan-Americanism.

In an address made at the laying of the cornerstone of the Pan-American building located in the city of Washington, the Ambassador of Brazil to the United States, referring to the sentiment which

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brought about the foundation of the union between the Republics of America, said: "So many sovereign states would not have been drawn so spontaneously and so strongly together, as if by an irresistible force, if there did not exist throughout them at the bottom or at the top of each national conscience the feeling of a density common to all America. It seems indeed that a decree of Providence made the western shores of the Atlantic appear late in history as the chosen land for a great renewal of mankind. From the early days of colonization the sentiment sprung up in the hearts of all children that this is really a new world * * * We feel that we are all sons of Columbus; * * * we feel also that we are all sons of Washington."

Never before has an opportunity like the present one arisen to apply "Pan-Americanism" in its true sense. If the American Republics stand together now, and treat one another rightly, they will be able to cement their friendship, commercial relations and interests for all time, and thus the United States will have won a position in South American trade, from which it will perhaps never be dislodged.

APPENDIX I LATIN AMERICAN FOREIGN TRADE IN 1914—A GENERAL SURVEY.

Countries.	Imports.			Exports.			Total foreign trade.		
	1913	1914	Increase.	1913	1914	Increase.	1913	1914	Increase.
Mexico.....	\$891,331,155	\$897,886,160	\$6,555,014	\$148,994,564	\$150,302,808	\$1,208,244	\$240,325,719	\$248,088,977	\$7,763,258
Guatemala.....	10,062,328	9,331,115	731,213	12,754,027	12,754,027	0	24,512,254	22,085,944	2,427,112
Salvador.....	6,173,545	4,968,694	1,204,851	9,928,724	10,796,465	867,741	16,102,269	15,755,119	347,150
Honduras.....	5,132,678	6,624,930	1,492,252	3,300,254	3,421,331	121,077	8,432,932	10,046,261	1,613,329
Nicaragua.....	5,770,006	4,134,323	1,635,683	7,112,047	4,955,050	2,156,997	13,482,053	9,089,373	4,392,680
Costa Rica.....	8,778,497	7,632,880	1,145,617	10,432,553	10,972,541	540,000	19,211,050	18,611,421	599,629
Panama.....	11,397,000	9,885,000	1,512,000	15,383,027	14,500,000	883,027	26,780,027	24,385,000	2,395,027
Cuba.....	143,758,736	119,001,410	24,757,326	164,823,059	177,555,954	12,732,895	308,581,795	296,555,954	12,026,431
Dominican Republic.....	9,372,278	6,728,007	2,644,271	10,460,949	10,588,787	118,840	19,742,225	17,317,794	2,424,431
Haiti.....	9,876,555	8,100,125	1,776,430	11,728,455	11,315,539	412,916	21,604,990	19,413,334	2,191,656
North American Republics...	301,552,778	274,283,583	27,269,195	392,779,536	397,066,532	4,286,996	694,332,364	671,350,135	22,982,229
Argentina.....	408,711,966	283,663,353	125,048,613	468,999,410	338,776,517	130,222,893	877,711,376	602,439,880	275,271,496
Bolivia.....	21,357,505	15,506,876	5,850,629	36,551,390	25,662,447	10,888,943	57,908,895	41,169,323	16,739,572
Brazil.....	326,428,509	165,746,688	160,681,821	315,164,687	221,639,029	93,525,658	641,593,196	387,285,717	254,307,479
Chile.....	120,274,001	98,461,195	21,812,806	144,663,312	109,381,534	35,281,778	264,927,313	207,842,729	57,084,584
Colombia.....	28,535,800	20,979,229	7,556,571	34,315,800	32,632,884	1,682,916	62,851,600	53,612,113	9,239,487
Ecuador.....	8,536,689	8,402,767	133,922	15,768,367	13,061,566	2,706,801	24,626,056	21,464,333	3,161,723
Paraguay.....	7,876,397	4,994,980	2,881,417	5,602,001	4,446,827	1,155,174	13,338,398	9,441,807	3,896,591
Peru.....	29,591,451	25,493,740	4,097,711	44,409,610	42,611,460	1,798,150	74,001,061	66,075,200	7,925,861
Uruguay.....	50,666,000	38,724,272	11,941,728	65,142,000	54,515,554	10,626,446	115,808,000	93,230,826	22,567,174
Venezuela.....	18,030,103	13,987,465	4,042,638	29,483,789	21,520,533	7,963,256	47,513,892	35,507,993	12,005,894
South American Republics...	1,020,308,421	652,930,575	367,377,846	1,159,971,366	864,148,351	295,823,015	2,180,279,787	1,518,075,926	662,203,861
Total Latin America.....	1,321,861,199	928,214,158	393,647,041	1,552,750,932	1,261,214,903	291,536,029	2,874,612,151	2,189,429,061	685,183,090

1 1912.
 2 1913 (latest available figures).
 * Official estimate.
 † Decrease.
 ‡ Figures corrected from prior advance publications.
 § Statistics compiled by the Pan-American Union, Washington, D. C.

APPENDIX II

Tables are here submitted indicating Earnings and Capitalization of a few of the more or less important Railways of South and Central America.

The statements are mostly rendered expressed in Pounds Sterling. In these tables, unless otherwise specified, the basis of \$5.00 per Pound Sterling is used.

ARGENTINE NORTH EASTERN RY.

Avg. Miles			Avg. Miles		
Year	Oper.	Gross	Year	Oper.	Gross
1908-10	560	\$1,227,670	1912-13	665	\$1,835,125
1910-11	614	1,465,115	1913-14	668	1,742,445
1911-12	665	1,596,590	1914-15	708	1,298,135

*A total of 752 miles was operated as of June 30, 1915.

STOCK OUTSTANDING

June 30, 1915.

*Ordinary\$12,842,500

*£2,768,500.

15% "A" Debentures and Debenture Stock, £1,200,000; 5% "B" Debentures and Debenture Stock, £982,000; 5% "C" Debentures and Debenture Stock, £1,000,000.

Temporary Loans outstanding June 30, 1915, £370,433 (\$1,852,165) secured by £800,000 "C" Debentures.

BONDS OUTSTANDING

June 30, 1915.

Debentures and Debenture Stock\$20,961,145

CAPITALIZATION

	Total	Per Mile
Stock(£2,768,500)	\$12,842,500	\$19,552
Bonds(4,192,229)	20,961,145	29,606
Total(6,960,729)	34,808,645	49,158

BUENOS AYRES & PACIFIC RY.

Avg. Miles			Avg. Miles		
Year	Oper.	Gross	Year	Oper.	Gross
1910-11	3,114	\$24,104,205	1912-14	3,473	\$24,408,325
1911-12	3,240	24,883,255	1914-15	3,527	22,694,715
1912-13	3,404	27,953,065			

*STOCK OUTSTANDING

June 30, 1915.

Ordinary\$50,000,000

†Preferred 1st (5%)..... 6,000,000

Preferred 2d (5%)..... 5,000,000

*These are the Stocks and Debenture Stocks of the parent company and do not include Securities of Leased and Controlled Lines. †Cumulative. ‡Includes £2,925,000 4% First Debenture Stock, £2,075,000 4½% Second Debenture Stock, £7,942,673 4½% Consolidated Debenture Stock and £4,000,000 5% Debenture Stock.

*BONDS OUTSTANDING

June 30, 1915.

†Debenture Stock\$84,712,365

CAPITALIZATION

(B. A. & P. Ry. Proper.)

	Total	Per Mile
Stock\$61,000,000	\$17,295	
Bonds84,712,365	24,019	
Total145,712,365	41,314	

BUENOS AYRES GREAT SOUTHERN RY.

Avg. Miles			Avg. Miles		
Year	Oper.	Gross	Year	Oper.	Gross
1906-6	2,506	\$19,484,400	1910-11	3,044	\$24,941,900
1906-7	2,613	21,270,045	1911-12	3,880	27,020,479
1907-8	2,613	22,211,880	1912-13	3,544	32,846,724
1908-9	2,716	23,241,495	1913-14	3,655	27,322,940
1909-10	2,770	23,009,620	1914-15	3,763	24,708,135

***STOCK OUTSTANDING**

June 30, 1915.

Ordinary\$145,450,000

Preference (5%) 40,000,000

*Ordinary, £20,090,000; Preference, £8,000,000. †4% Debenture Stock, £15,472,560; 4½% Debenture Stock issued to Buenos Ayres Western Ry. in purchase of the Saladillo Branch, £1,032,930; 4½% B. A. W. Ry. Annuity account Brandzen Branch, £242,600.

†BONDS OUTSTANDING

June 30, 1915.

Debenture Stock\$82,527,450

Annuity (4½%) 1,213,000

CAPITALIZATION

	Total	Per Mile
Stock	\$185,450,000	\$49,282
Debenture Stock, etc.....	83,740,450	22,254
Total	269,190,450	71,536

BUENOS AYRES CENTRAL RY.

Avg. Miles			Avg. Miles				
Year	Oper.	Gross	Year	Oper.	Gross		
1913-14	175	\$1,445,570	£289,114	1914-15	175	\$1,224,220	£244,844

STOCK OUTSTANDING

June 30, 1915.

*Ordinary\$8,802,185

*£1,760,437. †£700,000 First Mortgage

ond Mortgage Debenture 5%.

BONDS OUTSTANDING

June 30, 1915.

†Debentures\$6,500,000

Debenture 4½% and £600,000 Sec-

BUENOS AYRES WESTERN RY.

Avg. Miles			Avg. Miles				
Year	Oper.	Gross	Year	Oper.	Gross		
1907-8	1,219	\$11,026,185	£2,205,237	1911-12	1,659	\$12,128,413	£2,425,683
1908-9	1,305	11,484,300	2,296,860	1912-13	1,781	14,530,040	2,906,006
1909-10	1,365	11,502,550	2,300,510	1913-14	1,792	12,645,890	2,529,178
1910-11	1,586	13,170,932	2,634,186	1914-15	1,867	12,613,410	2,522,682

***STOCK OUTSTANDING**

June 30, 1915

Ordinary\$68,738,300

Preference (5%) 1,500,000

Preference (4½%) 12,761,700

†Extension (4%) 18,000,000

*£13,747,660 Ordinary; £300,000 5% Preference; £2,552,340 4½% Preference; £3,600,000 Extension. †Converted into Ordinary Stock after June 30, 1915. †£1,000,000 Government Bonds, 1888 issue; £7,872,203 4% Debenture Stock; £800,267 instalments paid on issue of £1,000,000 5% Terminable Debenture Stock (1925).

BONDS OUTSTANDING

June 30, 1915

†Fixed Interest\$48,362,350

CAPITALIZATION

	Total	Per Mile
Stock	\$101,000,000	\$54,097
Bonds	48,362,350	25,904
Total	149,362,350	80,001

CENTRAL ARGENTINE RY.

Avg. Miles			Avg. Miles		
Year	Oper.	Gross	Year	Oper.	Gross
1911-12	2,870	\$26,119,075	1913-14	3,151	\$30,290,700
1912-13	2,994	\$2,446,730	1914-15	3,286	\$2,776,270

*STOCK OUTSTANDING

June 30, 1915.

Consolidated Ordinary..\$140,934,750

Preference (4½%) 48,478,590

Deferred 4,069,000

*£28,186,960 Consolidated Ordinary Stock; £9,695,715 Preference;

£311,800 Deferred. †£13,438,764 Debenture Stock (4%); £113,564 Central

Debenture Stock; £2,017,500 Western Annuity; 6% 3-Year Notes, £1-

000,000; 5% 5-Year Notes, £2,000,000.

†BONDS OUTSTANDING

June 30, 1915.

Fixed Interest \$67,761,640

Western Annuity 10,087,500

Notes 15,000,000

CAPITALIZATION

	Total	Per Mile
Stock	\$193,472,340	\$58,578
Bonds	92,539,140	28,253
Total	286,311,480	87,131

CENTRAL RY. OF CHUBUT CO.

(Patagonia.)

Avg. Miles			Avg. Miles		
Year	Oper.	Gross	Year	Oper.	Gross
1911-12	51	\$175,920	1913-14	51	\$189,750
1912-13	51	200,260	1914-15	51	142,930

STOCK OUTSTANDING

June 30, 1915.

Ordinary£200,000

DEBENTURES OUTSTANDING

June 30, 1915.

Debentures (6%)£125,000

CORDOBA CENTRAL RY.

Avg. Miles			Avg. Miles		
Year	Oper.	Gross	Year	Oper.	Gross
1909-10	1,149	\$4,553,025	1912-13	1,176	\$6,818,500
1910-11	1,170	5,001,855	1913-14	1,184	6,739,990
1911-12	1,172	5,496,215	1914-15	1,186	6,013,125

STOCK OUTSTANDING

June 30, 1915

*Ordinary\$20,343,635

†Preference 1st (5%) 7,200,000

†Preference 2d (5%)..... 8,309,475

*£57,120 of the Ordinary (Income)

Dividend until July 1, 1917. †Cumulative. ‡\$3,500,000 of the Second

Preference Stock does not rank for possible Dividends until July 1,

1916.

BONDS OUTSTANDING

June 30, 1915

1st Deb. Stock (4%).....\$40,000,000

2d Deb. Stock (4%) 25,000,000

3-year Notes (6%) 1,243,000

CAPITALIZATION

	Total	Per Mile
Stock	\$35,853,110	\$30,230
Bonds	66,243,000	55,854
Total	102,096,110	86,084

PROVINCE OF BUENOS AYRES RY.

Year 1911-12: Miles Operated, 790; Gross Receipts, 12,811,114 francs;
Net Receipts, 2,701,653 francs.

Capitalization: Stock, 50,000,000 francs; Debentures, 175,000,000 francs.

ENTRE RIOS RYS.

(Argentine Republic.)

Avg. Miles				Avg. Miles			
Year	Oper.	Gross		Year	Oper.	Gross	
1911-12	688	\$2,360,506	£472,101	1913-14	742	\$3,049,250	£609,850
1912-13	730	3,066,726	611,145	1914-15	730	2,183,150	437,630

Surplus after Charges for each of the four years as above was as follows: 1911-12, £89,232; 1912-13, £117,320; 1913-14, £135,010; 1914-15 (deficit) £61,043.

*STOCK OUTSTANDING

June 30, 1915.

Ordinary	\$3,915,700
Preference 1st (5%)	10,000,000
Preference 2d (4%)	3,670,245

*£1,783,140 Ordinary Stock, £2,000,000 5% First Preference Stock and £734,049 Second Preference Stock. †£1,506,000 4% Debenture Stock, £700,000 5% Debentures, £1,303,000 5% Consolidated Debenture Stock.

BONDS OUTSTANDING

June 30, 1915.

†Debenture Stock and Debentures	\$17,540,000
--	--------------

CAPITALIZATION

		Total	Per Mile
Stock	(£4,517,189)	\$22,535,945	\$30.939
Debentures	(3,508,000)	17,540,000	24.028
Total	(8,025,189)	40,125,945	54.967

SANTA FE RY.

(Argentine Republic.)

Mileage Operated June 30, 1914, 1,186 miles (approximate) as compared with 1,068 miles operated June 30, 1913.

Gross Earnings, 1913-14, \$5,484,567 (U. S. Gold); 1912-13, \$5,861,317; 1911-12, \$5,590,116.

Capitalization June 30, 1915, 72,000,000 francs stock (all one class).

Bonds outstanding (June 30, 1914) 174,654,097 francs (mostly 4½%).

ANTOFAGASTA (CHILE) & BOLIVIA RY.

(Chile and Bolivia.)

Avg. Miles			Avg. Miles		
Year	Oper.	Gross	Year	Oper.	Gross
1911	...	\$7,584,425	1913	795	\$9,068,875
1912	769	8,319,675	1914	820	7,154,635

Gross Receipts for year 1915 were £1,321,810.

£1,516,885	£1,811,775
1,663,935	1,430,927

STOCK OUTSTANDING

December 31, 1914.

Pfd. Ordinary	\$10,000,000
Def. Ordinary	10,000,000
Preference (5%)	10,000,000

BONDS OUTSTANDING

December 31, 1914.

*Debenture Stock	\$20,500,000
†Notes (6%)	3,000,000

*These Debenture Stocks bear Interest from 4% to 5% per annum.
†This issue of £600,000 Notes matures December 15, 1916.

BRAZIL RY.

(Lines Directly Operated.)

Year	Gross	Net	Year	Gross	Net
1908	£1,568,869	£672,398	1911	£2,330,405	£1,029,424
1909	1,835,422	909,563	1912	2,576,600	1,140,600
1910	2,338,491	896,229	1913	2,861,133	1,051,000

The mileage directly operated as of January, 1915, totalled 3,405 miles.

The earnings as stated above do not include those of the Paulista Ry. (\$10,319,480 in 1912) and those of the Mogiana Ry. (\$8,130,377 in 1912). The combined earnings of these two systems for 1913 were \$19,233,000 and the net earnings were approximately \$8,725,000.

The capitalization of the Brazil Ry., December 31, 1913, consisted of \$32,000,000 common stock; \$15,000,000 6% non-cumulative preferred stock and \$5,000,000 6% cumulative preferred stock. The funded debt of the Brazil Ry. proper amounted to \$96,949,823.

GREAT WESTERN OF BRAZIL RY.

Year	Avg. Miles Oper.	Gross	Year	Avg. Miles Oper.	Gross
1911	934	\$3,224,440	1914	1010	\$3,208,000
1912	1004	3,424,925	1915	1010	2,577,000
1913	1010	3,795,000			

Capitalization December 31, 1915: £1,000,000 6% Preferred Stock; £1,250,000 Ordinary Stock; £1,979,650 Debenture Stock.

LEOPOLDINA RY.

(Brazil.)

Year	Avg. Miles Oper.	Gross	Year	Avg. Miles Oper.	Gross
1904	1423	£800,032	1910	1585	£1,318,116
1905	1423	1,126,167	1911	1625	1,365,919
1906	1423	1,182,825	1912	1651	1,698,926
1907	1489	1,254,557	1913	1752	1,872,476
1908	1542	1,206,617	1914	1786	1,549,866
1909	1542	1,215,083	1915	1806	1,537,492

STOCK OUTSTANDING

Dec. 31, 1915.

Ordinary	£5,690,690
Preference (5½%)	2,845,340

BONDS OUTSTANDING

Dec. 31, 1915.

4% Deb. Stock	£4,495,305
5% Debentures (1923)	1,000,000

SAN PAULO RY.

Note: The statements of this Company are rendered expressed in Pounds Sterling. In this table the basis of \$4.86 per Pound Sterling is used.

Year	Avg. Miles Oper.	Gross	Surplus	Year	Avg. Miles Oper.	Gross	Surplus
1913-14	154	\$10,521,327	\$2,984,351	1914-15	154	\$7,010,206	\$2,025,861

STOCK OUTSTANDING

June 30, 1915.

Common	\$14,580,000
Preference (5%)	4,860,000

BONDS OUTSTANDING

June 30, 1915.

Debenture Stock (5½%)	\$3,645,000
Debenture Stock (5%)	1,215,000
Debenture Stock (4%)	4,860,000

CAPITALIZATION

	Total	Per Mile
Stock	\$19,440,000	\$126,234
Bonds	9,720,000	63,117
Total	29,160,000	189,351

PARAGUAY CENTRAL RY.

Avg. Miles			Avg. Miles		
Year	Oper.	Gross	Year	Oper.	Gross
1909-10	156	\$485,630	1912-13	232	\$732,555
1910-11	168	600,115	1913-14	240	781,200
1911-12	232	569,915	1914-15	255	503,870

The Gross Earnings as above expressed in Paraguayan Currency amounted to \$7,308,365 (paper), 1909-10; \$7,744,708, 1910-11; \$7,217,080, 1911-12; \$11,067,962, 1912-13; \$13,420,425, 1913-14; \$14,300,200, 1914-15. The rate of exchange has fluctuated widely during recent years, reaching its lowest level in 1914-15.

The Capitalization of the Paraguay Central Ry. as of June 30, 1915, consisted of £562,930, Ordinary Shares of £10 each, £600,000 6% Prior Lien Debenture Stock, £500,000 6% Three-Year Notes and £1,300,000 5% Debenture Stock.

DEMERARA RY.

Avg. Miles			Avg. Miles		
Year	Oper.	Gross	Year	Oper.	Gross
1908-09	75	\$277,965	1911-12	75	\$248,585
1909-10	75	280,455	1912-13	75	237,505
1910-11	75	262,305	1913-14	75	269,405
			1914-15	*79	268,955

*Demerara Ry. (21 miles); Berbice Ry. (39 miles); West Coast Ry. (19 miles).

STOCK OUTSTANDING

June 30, 1915.	
Ordinary	\$325,000
Pfd. Ordinary (3½%)	161,000
Preference (7%)	575,000
Extension P'ice (4%) ...	1,562,500

DEBENTURES OUTSTANDING

June 30, 1915.	
Debenture Stock (4%).....	\$350,000

CAPITALIZATION

	Total	Per Mile
Stock (£624,700)	\$3,123,500	\$41,646
Debenture Stock (£70,000)	350,000	4,667
Total	3,473,500	46,313

CENTRAL URUGUAY RY. OF MONTEVIDEO.

Total Mileage operated June 30, 1915, including Extensions, 978 miles.

Gross Receipts, year ending June 30, 1915, £946,767 as compared with £1,103,229 for year 1913-14.

The Central of Uruguay has outstanding £800,000 5½% preference stock and £2,000,000 ordinary stock. The Central Uruguay (Original Line and Western Extension) had outstanding £2,499,408 Debentures and Debenture Stock. The various other Extensions operated by the "Central" are leased or operated under working agreements (see Chapter IX).

PANAMA R. R.

Year	Avg. Miles Oper.	Gross	Surplus	Year	Avg. Miles Oper.	Gross	Surplus
1907-8	50	\$4,541,438	\$1,390,017	1911-12	51	\$4,677,366	\$1,762,049
1908-9	50	4,287,162	1,522,780	1912-13	62	4,599,163	2,179,176
1909-10	50	4,224,062	1,254,778	1913-14	62	4,567,406	2,303,340
1910-11	50	4,149,445	1,711,080	1914-15	*57	†2,787,057	914,861

*Actual mileage of tracks maintained by Panama R. R., 208 miles. This included 77 miles owned by the Panama Canal division of the U. S. Government. †Does not include \$2,842,457 Gross Revenues from Steamship Line (\$2,255,101 in 1913-14; \$2,151,158 in 1912-13; \$1,996,299 in 1911-12, and \$1,860,111 in 1910-11.

†STOCK OUTSTANDING

	June 30, 1915.
Common	\$7,000,000

*DUE U. S. GOVERNMENT

For Improvements, etc...	\$1,399,115
For Funds Advanced to	
Pay Off Bonds	1,848,217

*In accordance with an act of Congress, March, 1911, the Company has been relieved from further payments as to principal and interest. The Company, however, until further action, is held accountable for this indebtedness.

CAPITALIZATION

	Total	Per Mile
Stock	\$7,000,000	\$122.807
Due U. S. Government	3,247,332	56.971
Total	10,247,332	179.778

INTERNATIONAL RYS. OF CENTRAL AMERICA.

Year	Avg. Miles Oper.	Gross	Surplus	Year	Avg. Miles Oper.	Gross	Surplus
1912	407	\$2,352,385	\$820,891	1914	*520	†\$2,595,249	†\$623,490
1913	489	2,461,797	723,411				

*Total mileage operated December 31, 1914, includes Atlantic Division (Guatemala Ry.), 196 miles; Central Division (Guatemala Central R. R.), 158 miles; Occidental Division, 51 miles; Ocos Division, 20 miles; Salvador Division, 84 miles; also mileage of Pan-American Extension from Las Cruces, 31 miles.

†Includes the Gross Earnings, \$174,189, of the Occidental Division (Occidental R. R.) not included in Income Account.

‡The Surplus, as shown in Company's annual report was \$562,928; the Surplus here shown includes, Net profits, \$60,557, of Occidental Division (Occidental R. R.). The International Rys. of Central America own 26,415 shares of a total of 30,000 outstanding shares of the last named company.

STOCK OUTSTANDING

	December 31, 1914.
Common	\$30,000,000
Preferred (6%)	10,000,000

BONDS OUTSTANDING

	December 31, 1914.
Fixed Interest	\$10,850,000

APPENDIX III

RAILWAYS OF CUBA AND SANTO DOMINGO

Although the Railways of the West Indies are not reviewed in the preceding chapters, certain data is here included as a matter of interest:

CUBA

CUBA R. R.

Avg. Miles				Avg. Miles			
Year	Oper.	*Gross	Surplus	Year	Oper.	*Gross	Surplus
1904-5	408	\$1,029,259	\$37,448	1910-11	602	\$2,994,410	\$797,316
1905-6	421	1,619,082	287,861	1911-12	602	3,726,339	1,059,862
1906-7	426	1,935,062	332,424	1912-13	602	4,478,194	1,414,280
1907-8	440	1,988,676	355,425	1913-14	602	4,964,641	1,651,606
1908-9	444	2,115,984	550,799	1914-15	602	5,022,793	1,873,684
1909-10	455	2,500,172	672,089				

*Does not include Gross Earnings of Antilla Terminals.

STOCK OUTSTANDING

	June 30, 1915.
Common	\$10,000,000
Preferred (6%)	10,000,000

BONDS OUTSTANDING

	June 30, 1915.
Fixed Interest	\$16,030,000
Equipment	1,324,000

CAPITALIZATION

	Total	Per Mile
Stock	\$20,000,000	\$33,223
Bonds	17,354,000	28,327
Total	37,354,000	62,050

An initial dividend of 4% was paid on the common stock May 1, 1913. On May 1, 1914, common stock was placed on a 6% basis by payment of a semi-annual dividend of 3%. The 6% rate has since been maintained. The preferred stock is entitled to 6% per annum non-cumulative dividends. An initial semi-annual dividend of 1½% was paid on the preferred stock in August, 1909; 3% was paid in 1909-10; also 4% in 1910-11, 5% in 1911-12 and 6% in 1912-13, in 1913-14 and 1914-15.

From 1905 to 1915 there has been an increase in Gross Earnings of 406% and in Net Earnings of 825%.

This railway's main line extends from Santiago westward to Santa Clara (365 miles), where connection is afforded with the lines of the United Rys. of the Havana & Regla Warehouses, the two lines forming a thorough route from Santiago to Havana. Branches extend to Manzanillo, Antilla and to other important places. Total mileage operated June 30, 1915, 602 miles; under construction, 56 miles.

CUBAN CENTRAL RYS.

Avg. Miles			Avg. Miles		
Year	Oper.	Gross	Year	Oper.	Gross
1909-10	241	\$2,328,550	1912-13	291	\$3,088,015
1910-11	255	2,300,430	1913-14	341	2,929,185
1911-12	269	2,489,910	1914-15	353	3,234,370

STOCK OUTSTANDING

June 30, 1915.

*Ordinary\$4,500,000

*Preference (5½%) 6,100,000

*Ordinary, £900,000; Preference (cumulative) £1,220,000. †Includes £771,700 4½% Mortgage Debentures; £91,806 8s. 7d. Mortgage Bonds of Acquired Companies and £1,178,000 5% Debenture Stock.

BONDS OUTSTANDING

June 30, 1915.

†Fixed Interest\$10,207,532

CAPITALIZATION

	Total	Per Mile
Stock (£2,120,000).....	\$10,600,000	\$30,028
Bonds (£2,041,506).....	10,207,532	28,917
Total (£4,161,506).....	20,807,532	58,945

This company (Registered in 1899) as of June 30, 1915, operated 353 miles of railway located in the central part of the Island of Cuba.

The dividends paid by this company during recent years have been as follows:

	'00-'01	'01-'03	'03-'12	'12-'13	'13-'14	'14-'15
Preference %	5½	5½	5½	5½	5½	5½
Ordinary %	1	0	2	3	2	4

Late in 1913 the United Rys. of the Havana & Regla Warehouses offered £7 10s of their Ordinary Stock carrying dividends from July 1, 1913, for each £10 Ordinary Share of the Cuban Central Rys. carrying dividend due July 1, 1913. About 88,500 of the 90,000 shares were acquired prior to June 30, 1915. Subsequently the United Rys. offered £10 in its preferred stock and 10s in its common stock for each £10 share of Cuban Central Rys. preference stock.

GUANTANAMO & WESTERN R. R.

Avg. Miles			Avg. Miles		
Year	Oper.	Gross	Year	Oper.	Gross
1911-12	75	\$382,342	1913-14	75	\$465,222
1912-13	75	440,774	1914-15	75	465,097

*Deficit.

STOCK OUTSTANDING

June 30, 1915.

Common\$2,750,000

Preferred 1st (7%)..... 2,750,000

Preferred 2d (5%)..... 250,000

Loans and Bills Payable, June 30, 1915, \$75,032; Loans and Bills Receivable, \$50,100.

*Does not include \$233,000 Common Stock, \$233,900 First Preferred Stock and \$153,000 Second Preferred Stock in Treasury.

BONDS OUTSTANDING

June 30, 1915.

Fixed Interest \$600,000

Equipment 130,000

Notes (6%) due 1916..... 428,500

CAPITALIZATION

	Total	Per Mile
Stock	\$5,750,000	\$76,667
Bonds	1,159,500	15,460
Total	6,909,500	92,127

This company, controlled in the interests of the Guantanamo Sugar Co., is the successor by reorganization to the Cuba Eastern R. R., Cuba Eastern Terminal, Northeastern Cuba R. R. and Eastern R. R. of Cuba, foreclosed in 1909. The line is located in the eastern part of Cuba and extends from Boqueron on the south coast via Guantanamo to a connection with the Cuba R. R. at San Luis.

UNITED RYS. OF THE HAVANA & REGLA WAREHOUSES, LTD.

Note: The statements of this Company are rendered expressed in Pounds Sterling. In this table, for convenience sake, the basis of \$5.00 per Pound Sterling is used.

Year	Avg. Miles		Gross		Year	Avg. Miles		Gross
	Oper.					Oper.		
1911-12	672	\$7,073,960	£1,414,792		1913-14	680	8,058,355	£1,611,671
1912-13	673	8,133,370	1,626,674		1914-15	681	8,461,810	1,692,862

*STOCK OUTSTANDING

June 30, 1915.

Ordinary	\$32,675,750
Deferred Ordinary	2,473,785
Preferred (5%)	13,932,145

†BONDS OUTSTANDING

June 30, 1915.

Debenture Stock	\$34,422,490
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*Ordinary, £6,535,150; Deferred Ordinary, £494,756; Preferred (Cumulative), £2,473,785. †£380,000 "A" Irredeemable Debenture Stock; £1,425,900 5% Consolidated Irredeemable Debenture Stock; £2,988,193 5% Irredeemable Debenture Stock (1906); £1,281,455 4% Redeemable Debenture Stock; £988,750 4½% Redeemable Debentures.

CAPITALIZATION

		Total	Per Mile
Stock	(£9,816,336)	\$49,081,680	\$72,073
Bonds	(7,064,298)	35,321,490	51,867
Total	(16,880,634)	84,403,170	123,940

The preference stock of this company is limited to cumulative dividends of 5% per annum, 5% dividends were paid on this class of stock in 1910-11, 1911-12, 1912-13, 1913-14 and 1914-15. 4½% was paid on the ordinary stock in 1911-12. In 1912-13 the dividend rate on the ordinary stock was increased to 5%. The 1913-14 dividend (5%) was paid in 5% Debenture Stock. In 1914-15 the 5% was paid in cash. No dividends were paid on the deferred ordinary stock. Additional deferred ordinary stock to the amount of £95,626 4s. 11d. is reserved to acquire additional shares of the Havana Central R. R. (acquired 1907). £7,228 preference stock and £94,306 ordinary were as of June 30, 1915, reserved to acquire additional stock of other companies (see following), and £706,344 preference, £10,940 deferred ordinary and £299,969 ordinary stock has been authorized but has not been issued.

The United Rys. of the Havana & Regla Warehouses, Ltd., was incorporated in 1898, and has since acquired: (1) in 1906, the Cardenas & Jucaro Ry.; (2) in 1906, the Matanzas Ry.; (3) in 1907, the Havana Central R. R.; (4) in 1911-12, the Western Ry. of Havana, Ltd.; (5) in 1913-14, the Cuban Central Rys. The consolidated company operates the largest railway mileage in the island of Cuba; its gross receipts are likewise considerably the largest. The main line extends from Havana to Santa Clara (176 miles), where connection is made with the Cuba R. R. main line, affording a direct route from Havana to Santiago and other eastern points. Lines extend to all of the important cities in the western portion of the island, connecting Havana with Cardenas, Matanzas, Cienfuegos and other important points. The Western Ry. of Havana, Ltd. (acquired 1911-12), extends from Havana to Guane near the western end of the island with branches (147 miles).

WESTERN RY. OF HAVANA.

Year	Avg. Miles		Gross		Year	Avg. Miles		Gross
	Oper.					Oper.		
1909-10	147	\$1,241,330	£248,284		1912-13	147	1,406,325	£281,265
1910-11	147	1,295,755	259,151		1913-14	147	1,433,525	286,705
1911-12	147	1,283,270	256,654		1914-15	147	1,440,080	288,012

STOCK OUTSTANDING

BONDS OUTSTANDING

June 30, 1915.		June 30, 1915.	
Ordinary	\$5,500,000	Debenture Stock (4½%) ..	\$2,950,000

CAPITALIZATION

	Total	Per Mile
Stock (£1,100,000)	\$5,500,000	\$37,415
Debenture Stock (£590,000)	2,950,000	20,068
Total (£1,690,000)	8,450,000	57,483

This railway line extends from Havana in a southwesterly direction to Pinar del Rio, San Juan and Guane. This is the only railway serving the state of Pinar del Rio and it handles a considerable volume of traffic. The company purchased during 1909-10 the property of the Vuelta-Abajo Steamship Co. at a cost of \$55,000 (£11,000).

The stock of the company received dividends at the rate of 7% per annum from 1905 to 1915 inclusive.

SANTO DOMINGO

SAMANA & SANTIAGO R. R.

Year	Avg. Miles		Gross		Year	Avg. Miles		Gross
	Oper.					Oper.		
1909	80	\$262,760	£52,552		1912	80	\$377,500	£75,500
1910	80	289,950	57,990		1913	80	389,950	77,990
1911	80	328,785	65,757		1914	80	369,650	73,930

Capitalization: £462,580 Ordinary Stock; £113,700 6% Preferred Stock; £63,500 3% Debentures.

Dividends of from 4% to 10% per annum have been paid on ordinary stock for a number of years.

APPENDIX IV

Highest Altitudes Reached by Railways Throughout the World.

Peruvian Central (Oroya) Ry...	15,865 ft.	Morochoca, Peru
Bolivia Ry.	15,814 ft.	Near Potosi, Bolivia
Antafogasta & Bolivia Ry.....	15,809 ft.	Near Ollague, Chile
Peruvian Central (Oroya) Ry...	15,665 ft.	Galera Tunnel, Peru
Peruvian Southern Ry.....	14,688 ft.	Crucero Alto, Peru
Peruvian Southern Ry.....	14,153 ft.	La Roya, Peru
Arica-La Paz Ry.....	14,108 ft.	Bolivia
Guaqui-La Paz Ry.....	13,396 ft.	Bolivia
Argentine Government Ry.....	12,000 ft.	Las Cruces, Argentina
Guayaquil & Quito Ry.....	11,841 ft.	Ecuador
Denver & Rio Grande R. R.....	11,330 ft.	Fremont Pass, U.S.A.
Denver & Rio Grande R. R.....	10,856 ft.	Marshall Pass, U.S.A.
Chilean Transandine Ry.....	10,466 ft.	La Cumbre, Chile
Rio Grande Southern R. R.....	10,248 ft.	Lizard Head, U.S.A.
Interoceanic of Mexico Ry.....	9,000 ft.	Nana Camlipa, Mex.
Uganda Ry.	8,320 ft.	Mate Pass, Uganda, Africa

The highest railway in Europe, the Brenner Ry. in Switzerland, reaches an altitude of only 4,485 ft.

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the polymerization of vinyl monomers in the presence of a catalyst.

The first step in the polymerization of vinyl monomers is the initiation of the reaction.

The initiation step involves the formation of a free radical species, which then reacts with the monomer to form a polymer chain.

The second step in the polymerization of vinyl monomers is the propagation of the reaction.

The propagation step involves the addition of monomer units to the growing polymer chain, which then reacts with the monomer to form a polymer chain.

The third step in the polymerization of vinyl monomers is the termination of the reaction.

The termination step involves the reaction of two polymer chains to form a single, larger polymer chain.

The fourth step in the polymerization of vinyl monomers is the transfer of the reaction.

The transfer step involves the reaction of a polymer chain with a monomer to form a new polymer chain.

The fifth step in the polymerization of vinyl monomers is the termination of the reaction.

The termination step involves the reaction of two polymer chains to form a single, larger polymer chain.

The sixth step in the polymerization of vinyl monomers is the transfer of the reaction.

The transfer step involves the reaction of a polymer chain with a monomer to form a new polymer chain.

The seventh step in the polymerization of vinyl monomers is the termination of the reaction.

The termination step involves the reaction of two polymer chains to form a single, larger polymer chain.

The eighth step in the polymerization of vinyl monomers is the transfer of the reaction.

The transfer step involves the reaction of a polymer chain with a monomer to form a new polymer chain.

The ninth step in the polymerization of vinyl monomers is the termination of the reaction.

The termination step involves the reaction of two polymer chains to form a single, larger polymer chain.

The tenth step in the polymerization of vinyl monomers is the transfer of the reaction.

The transfer step involves the reaction of a polymer chain with a monomer to form a new polymer chain.

The eleventh step in the polymerization of vinyl monomers is the termination of the reaction.

The termination step involves the reaction of two polymer chains to form a single, larger polymer chain.

The twelfth step in the polymerization of vinyl monomers is the transfer of the reaction.

The transfer step involves the reaction of a polymer chain with a monomer to form a new polymer chain.

The thirteenth step in the polymerization of vinyl monomers is the termination of the reaction.

The termination step involves the reaction of two polymer chains to form a single, larger polymer chain.